Day 4

Supraventricular Arrhythmias

Supraventricular Arrhythmias

Reading Assignment

Chapter 5
(p17-30)

The Supraventricular Rhythms In Our Lives

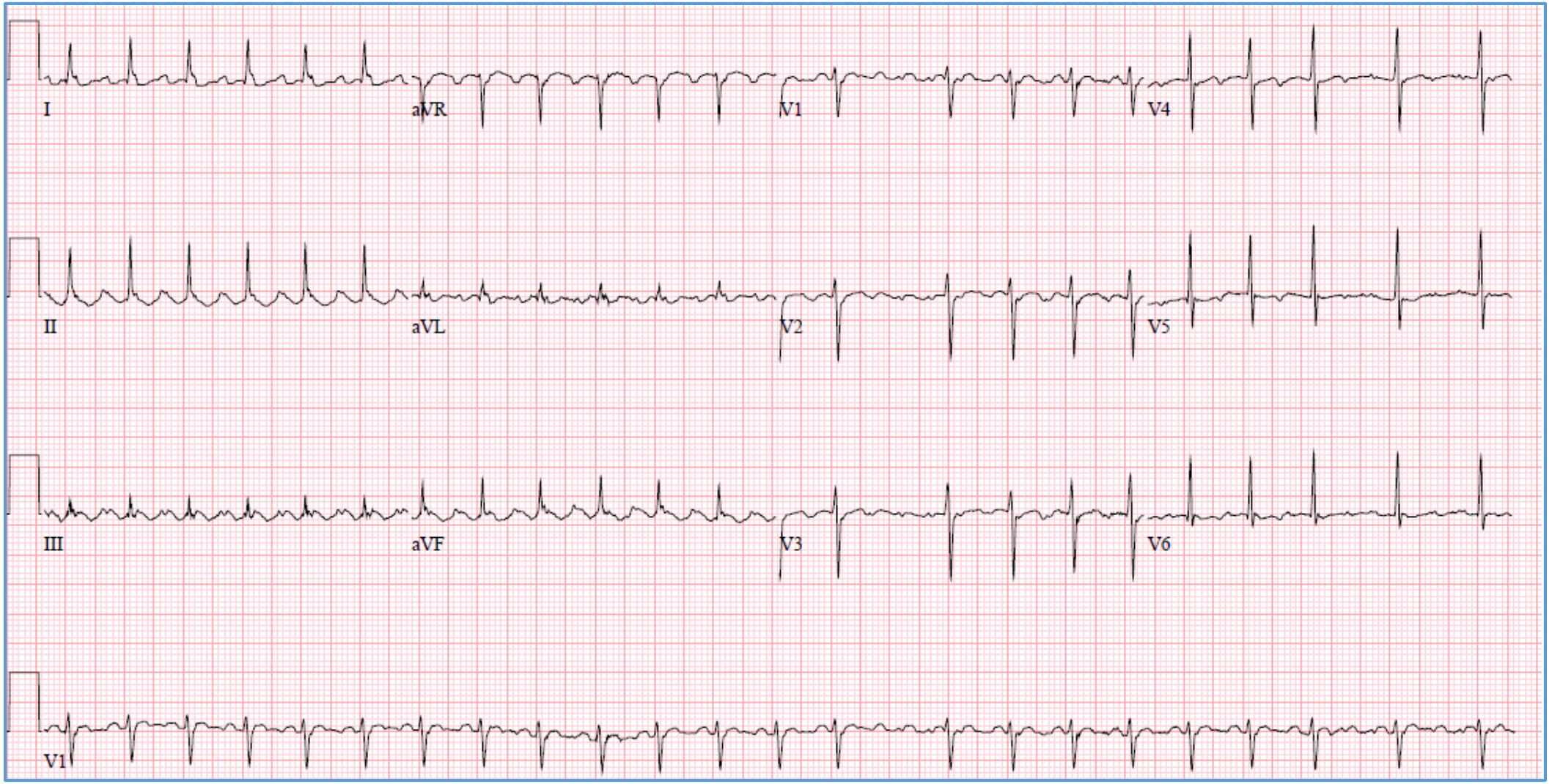
Site of Origin	Single Events	Slow Rates	Intermediate Rates	Fast Rates (>100 bpm)
Sinus		Sinus bradycardia	Normal sinus rhythm	Sinus tachycardia
Atrial	PAC's		Ectopic atrial rhythm Atrial fibrillation Atrial flutter (4:1 block)	Paroxysmal SVT Ectopic Atrial Tachycardia Atrial fibrillation Atrial flutter (e.g., 2:1 block) Multifocal atrial tachycardia
Junctional (AVN, His)	PJC's J- escape beats	J- escape rhythm (~40-50 bpm)	Accelerated J- rhythm (~55-100 bpm)	Junctional tachycardia Paroxysmal SVT: -AVNRT -AVRT (WPW)
Ventricular	PVC's V-escape beats	V- escape rhythm (~35-45 bpm)	Accelerated V- rhythm (~50-100 bpm)	Ventricular tachycardia Torsade de points Ventricular fibrillation

Welcome to the “5-Step Method”

ECG #:

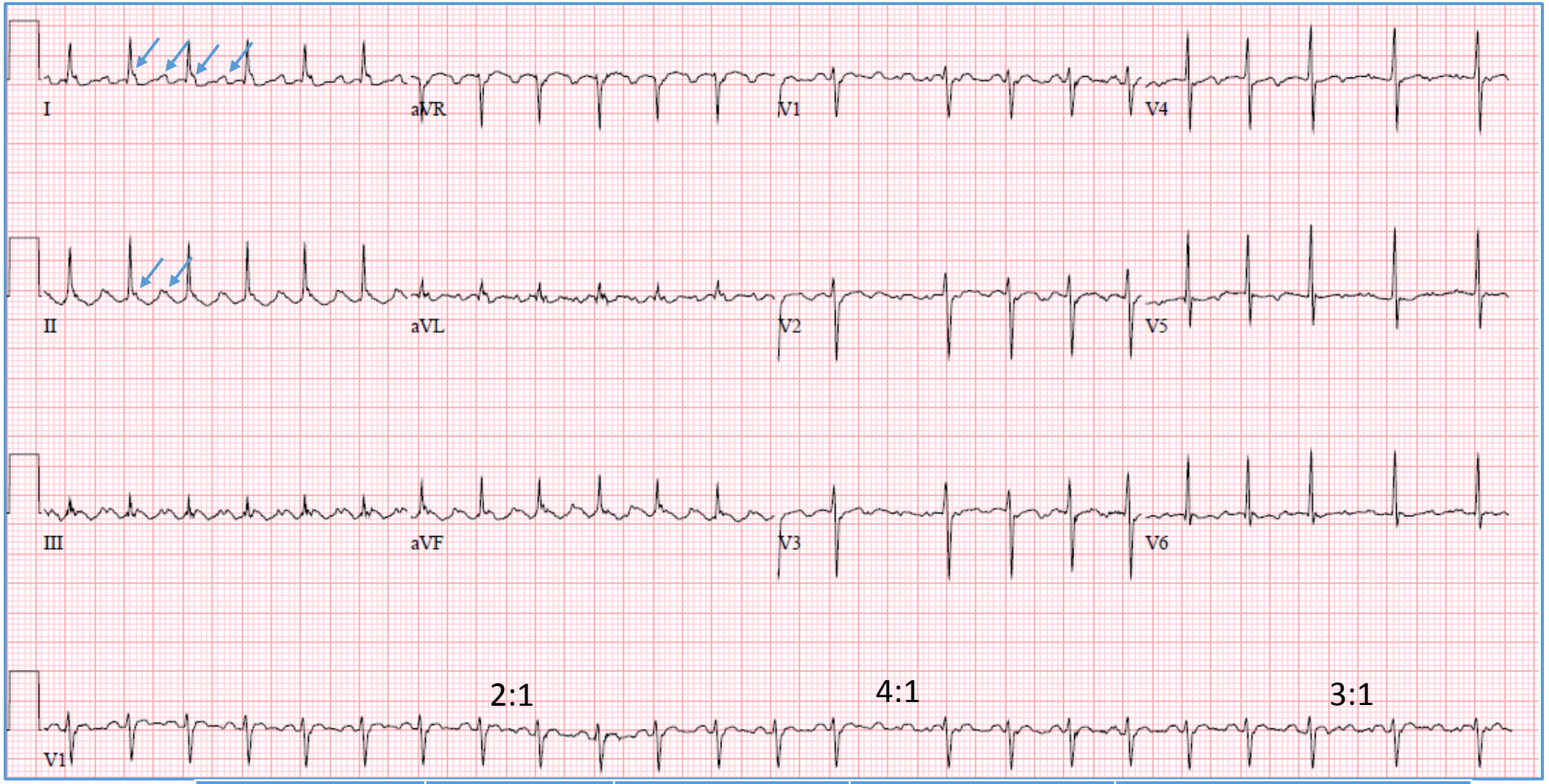
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= V=				
PR=				
QRS=				
QT=				
Axis=				

1. Compute the 5 basic measurements: HR, PR interval, QRS duration, QT interval, Axis
2. What’s the basic rhythm and other rhythm statements (e.g., PACs and PVC’s)
3. Any conduction abnormalities (SA blocks, AV blocks (Types I or II), and IV blocks
4. Waveform abnormalities beginning with P waves, QRS complexes, ST-T, and U waves
5. Final interpretations: Normal ECG or Borderline or Abnormal ECG (list final conclusions)

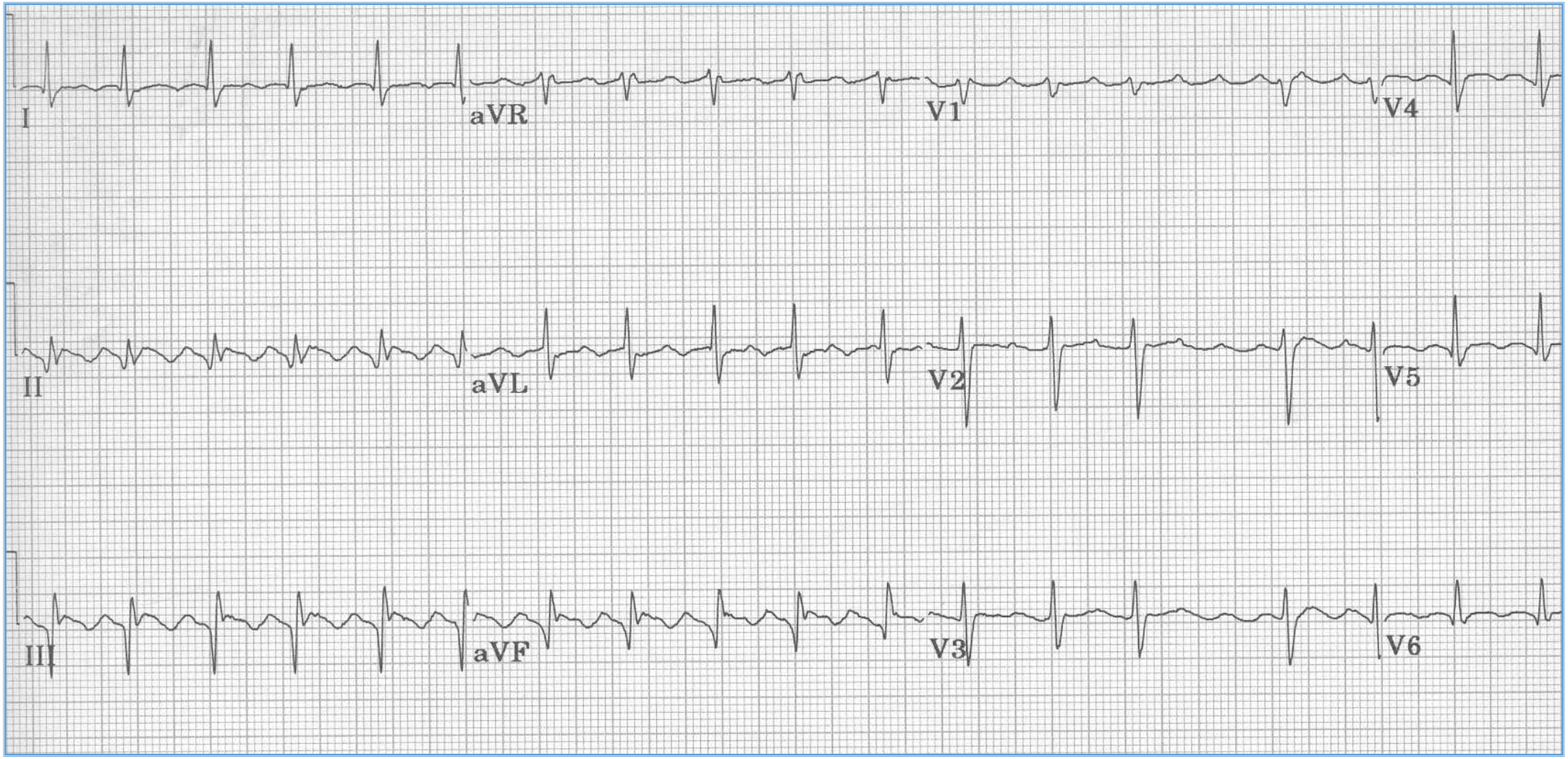


62 year old man

4-1

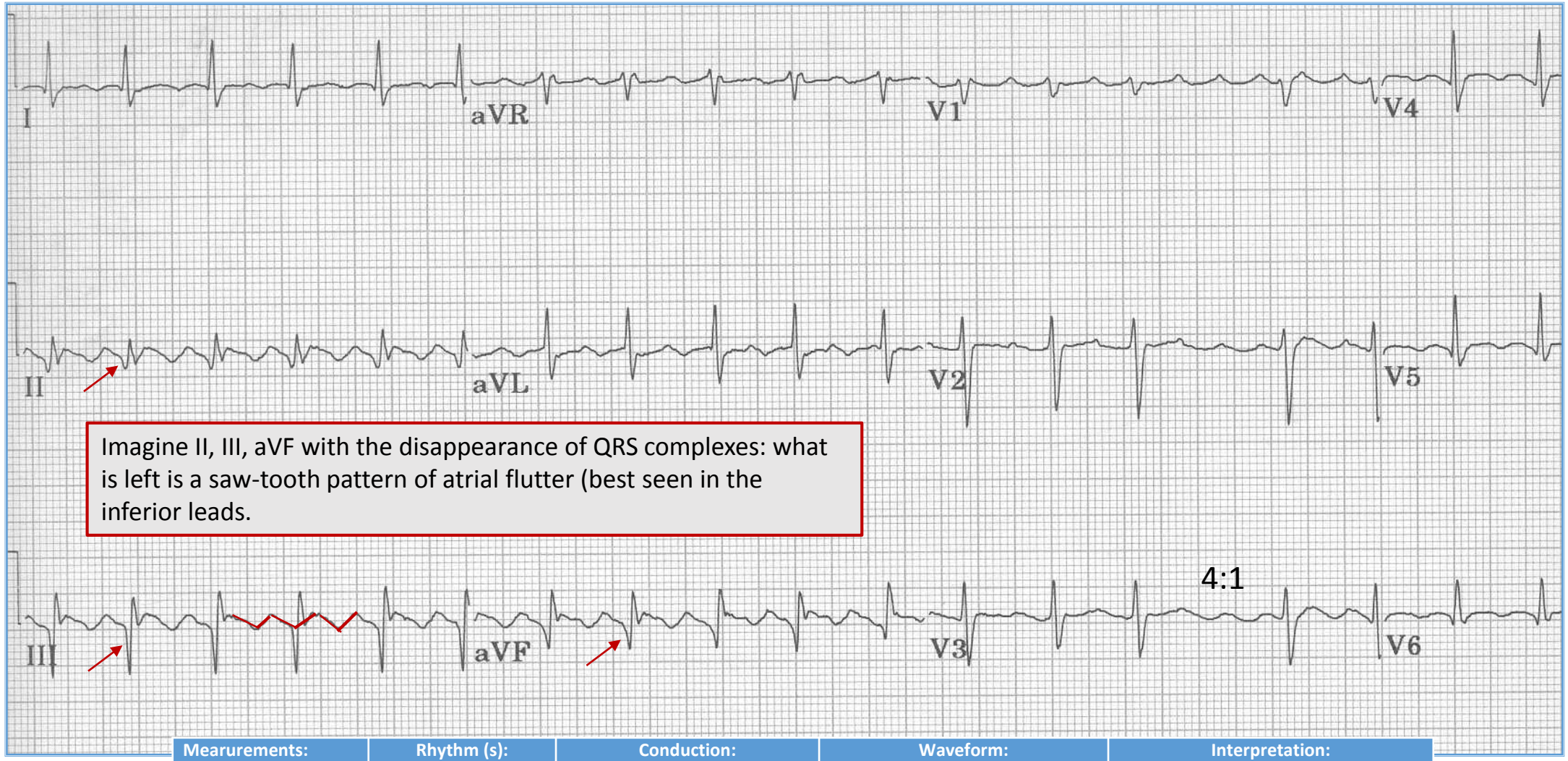


Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 300 V=150 PR= ? QRS=80 QT= ? Axis= +45	Atrial flutter	Mostly 2:1 AV conduction	Flutter waves (arrows) are hidden in the T and after the QRS; normal QRS, low amplitude T waves	Abnormal ECG: 1. Rhythm 2. Nonspecific T wave abnormalities Note; in every *regular* SVT @ ~150 bpm, always put *atrial flutter with 2:1 block* first on the list of diferential diagnoses! Look carefully for flutter waves. They are not equally well seen in every lead.



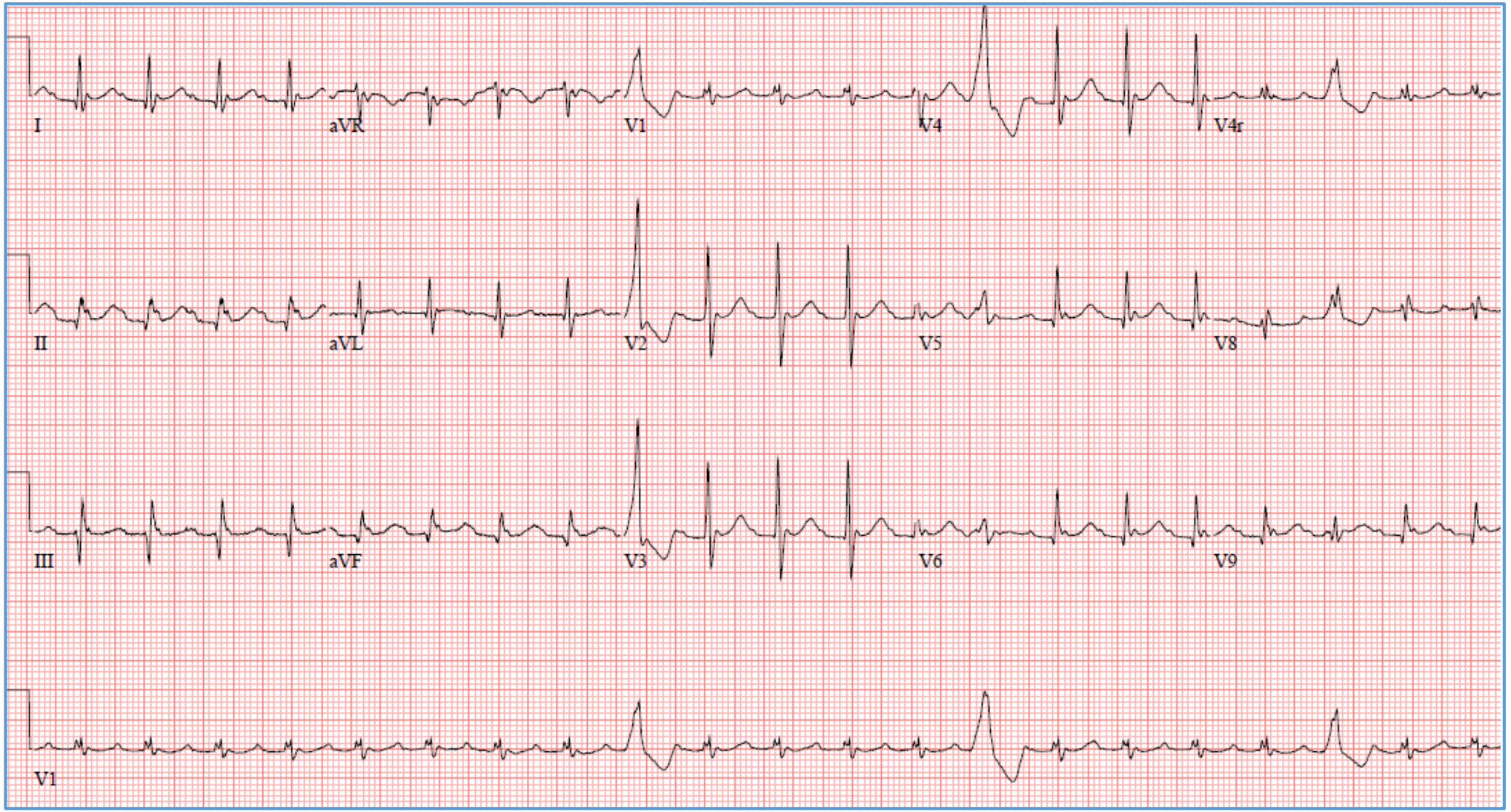
72 year old woman; hospital day 3

Why was she admitted?

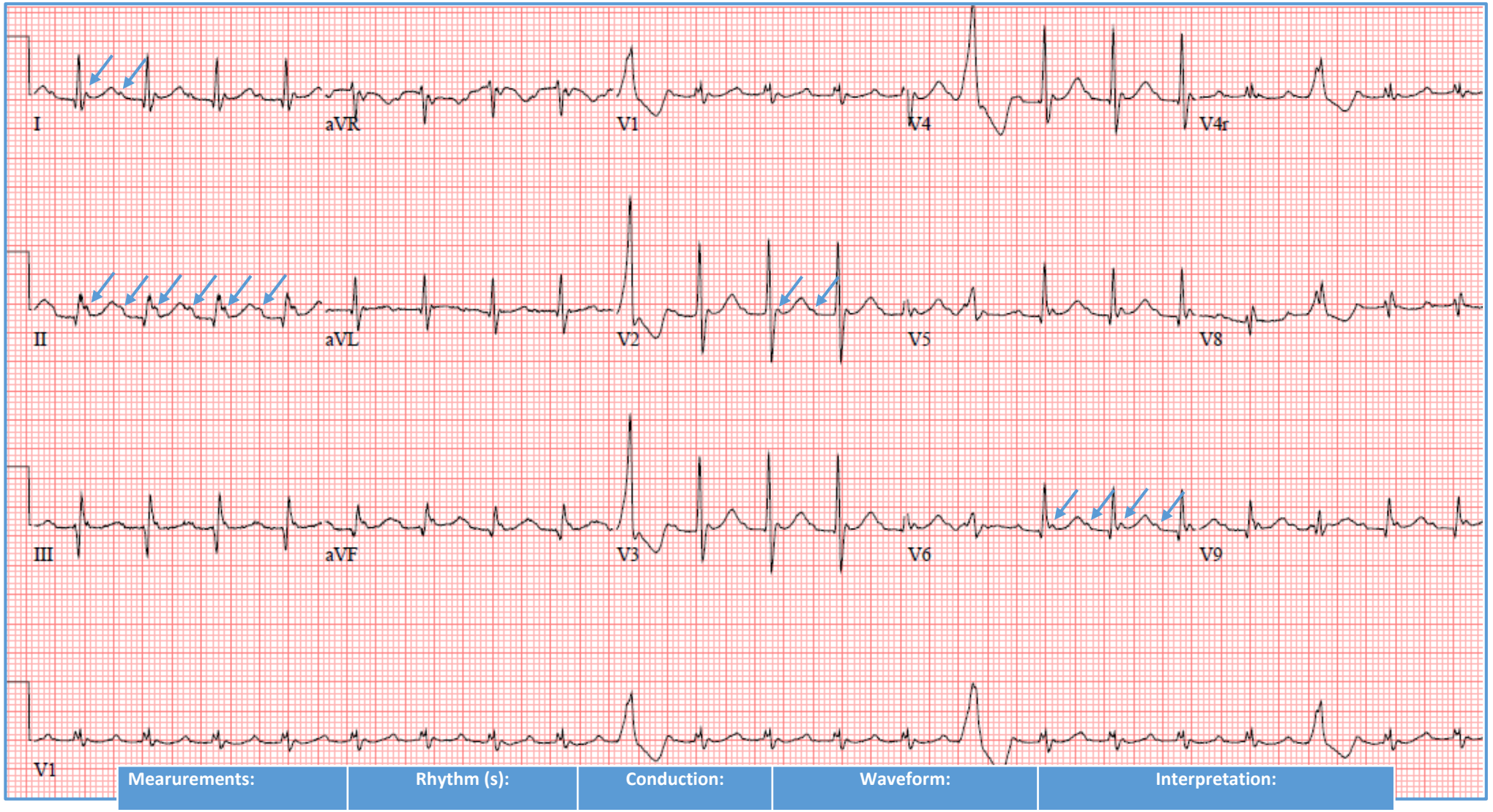


Imagine II, III, aVF with the disappearance of QRS complexes: what is left is a saw-tooth pattern of atrial flutter (best seen in the inferior leads.

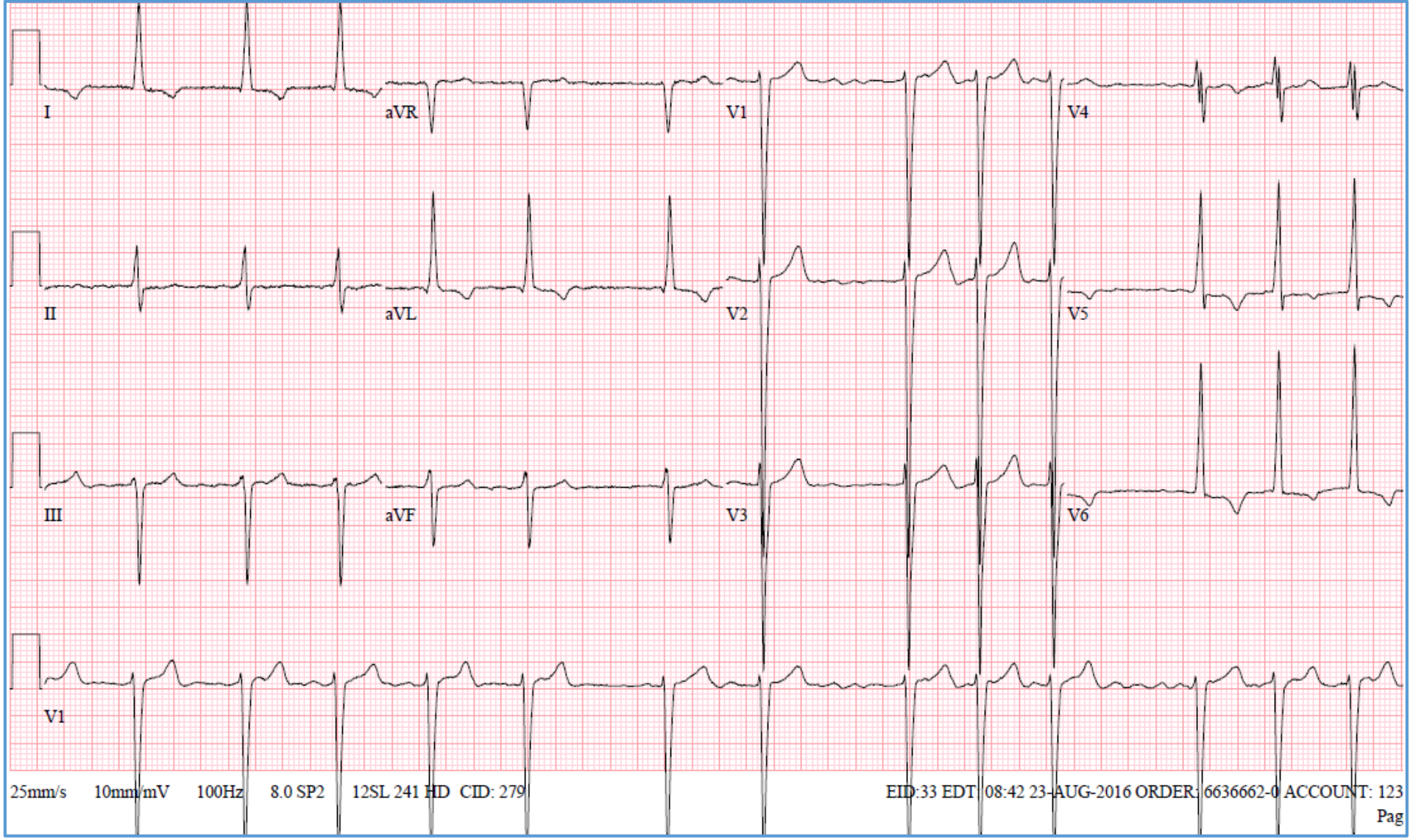
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 135 V= 270 PR= ? QRS=110 QT= ? Axis= ~ 0	Atrial flutter	• Mostly 2:1 AV conduction • IVCD (QRS 110 ms)	• flutter waves (saw-tooth) • Q's II, III, aVF (arrows) with questionable ST elevation (distorted by the flutter waves)	Abnormal ECG: 1. Rhythm and rate 2. Inferior MI (age undertermined, possibly recent) 3. Incomplete RBBB; note late rightward forces in I, aVL, V6



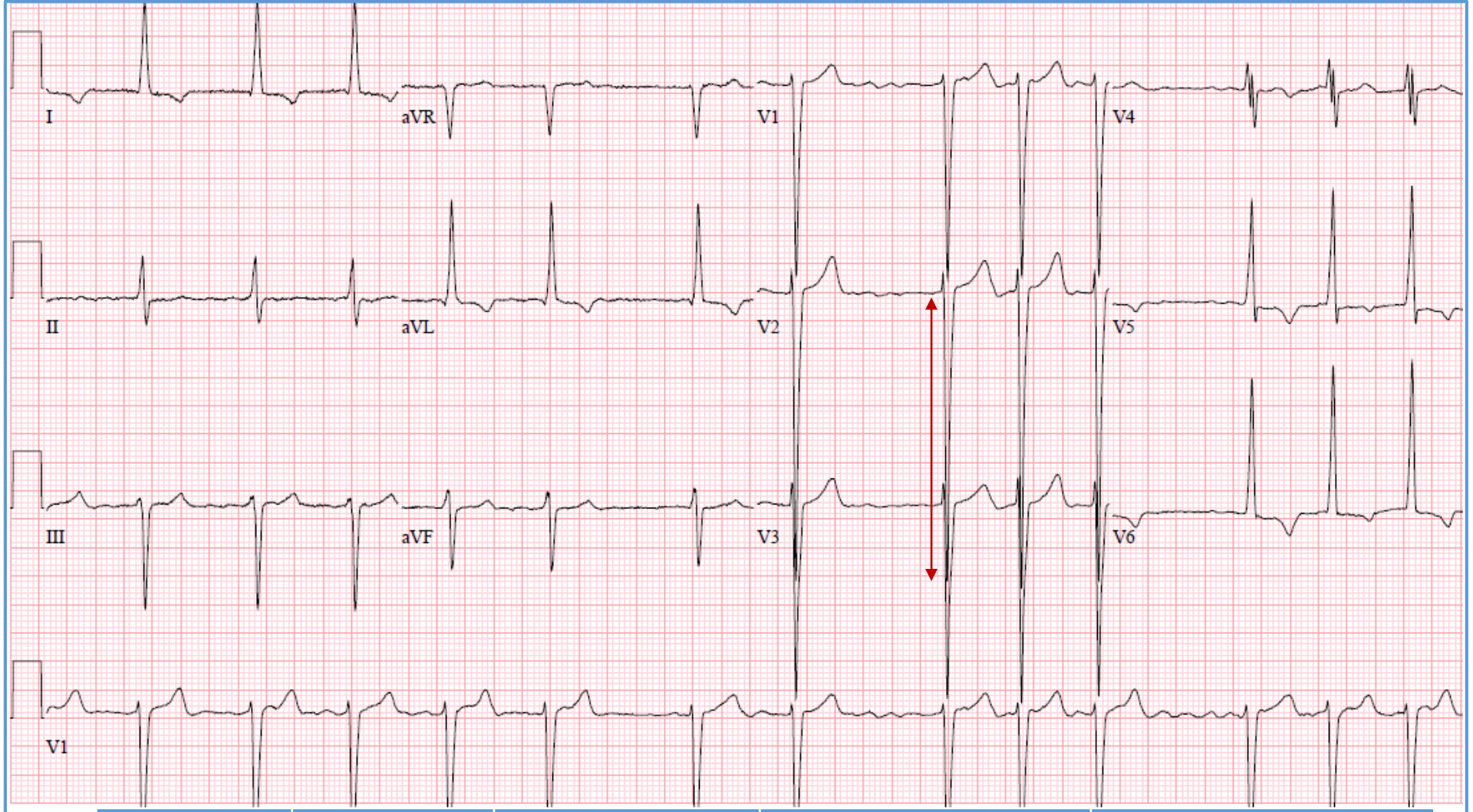
65 year old man with chest pain



Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=135 V=270 PR= ? QRS= 70 QT= ~340 Axis= +40	Atrial flutter and 3 PVCs	2:1 AV conduction	• Flutter waves (best seen in lead II, but also seen in other leads (arrows) • Q's II, III aVF • Prominent anterior forces (PAF); note R>S in V1-2	Abnormal ECG: 1. Rhythm (atrial flutter and few PVC's 2. PAF and inferior Q waves: infero-posterior (or new terminology infero-lateral MI – age undetermined)

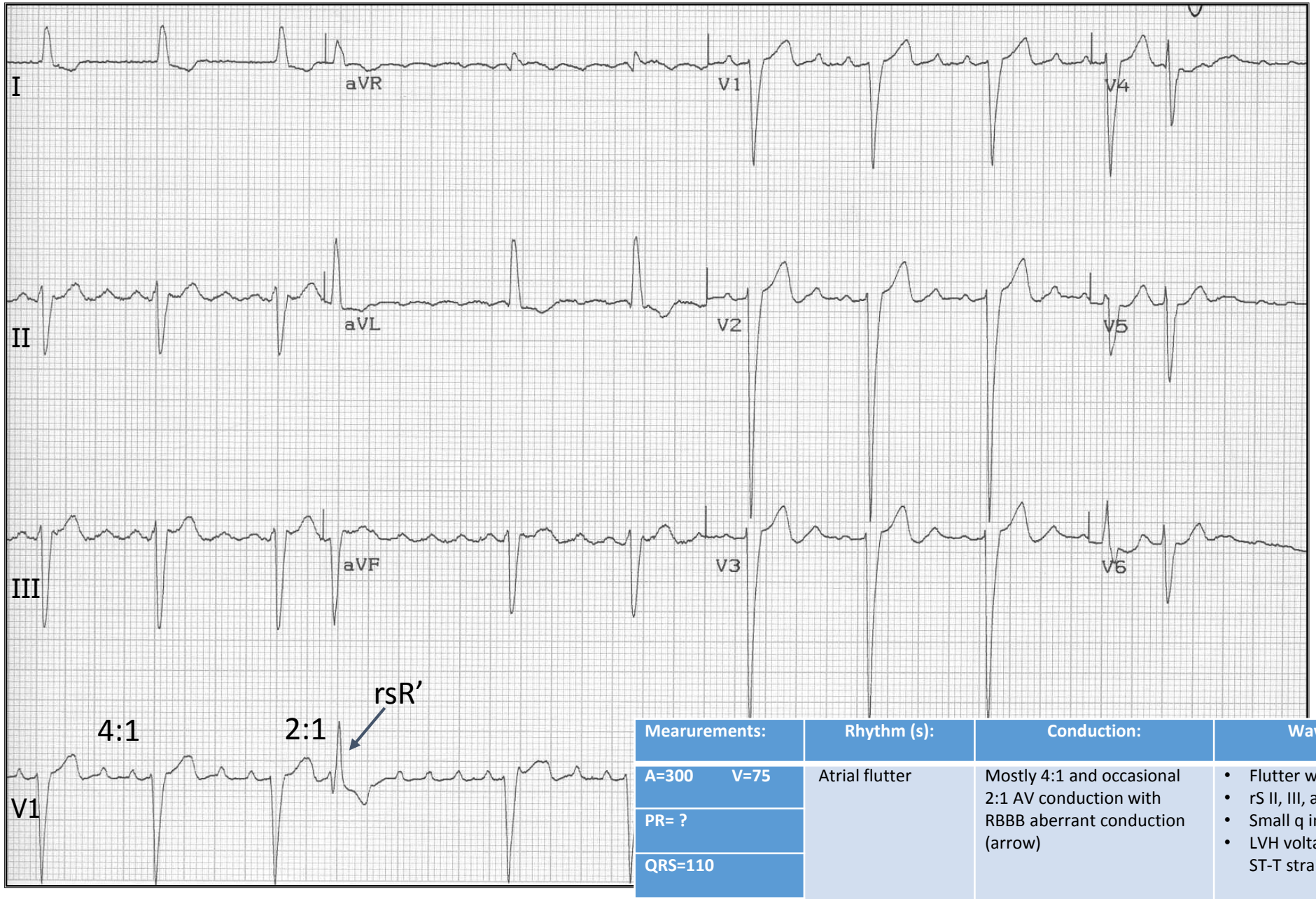


54 year old man admitted with HFrEF (EF 24%), elevated BNP



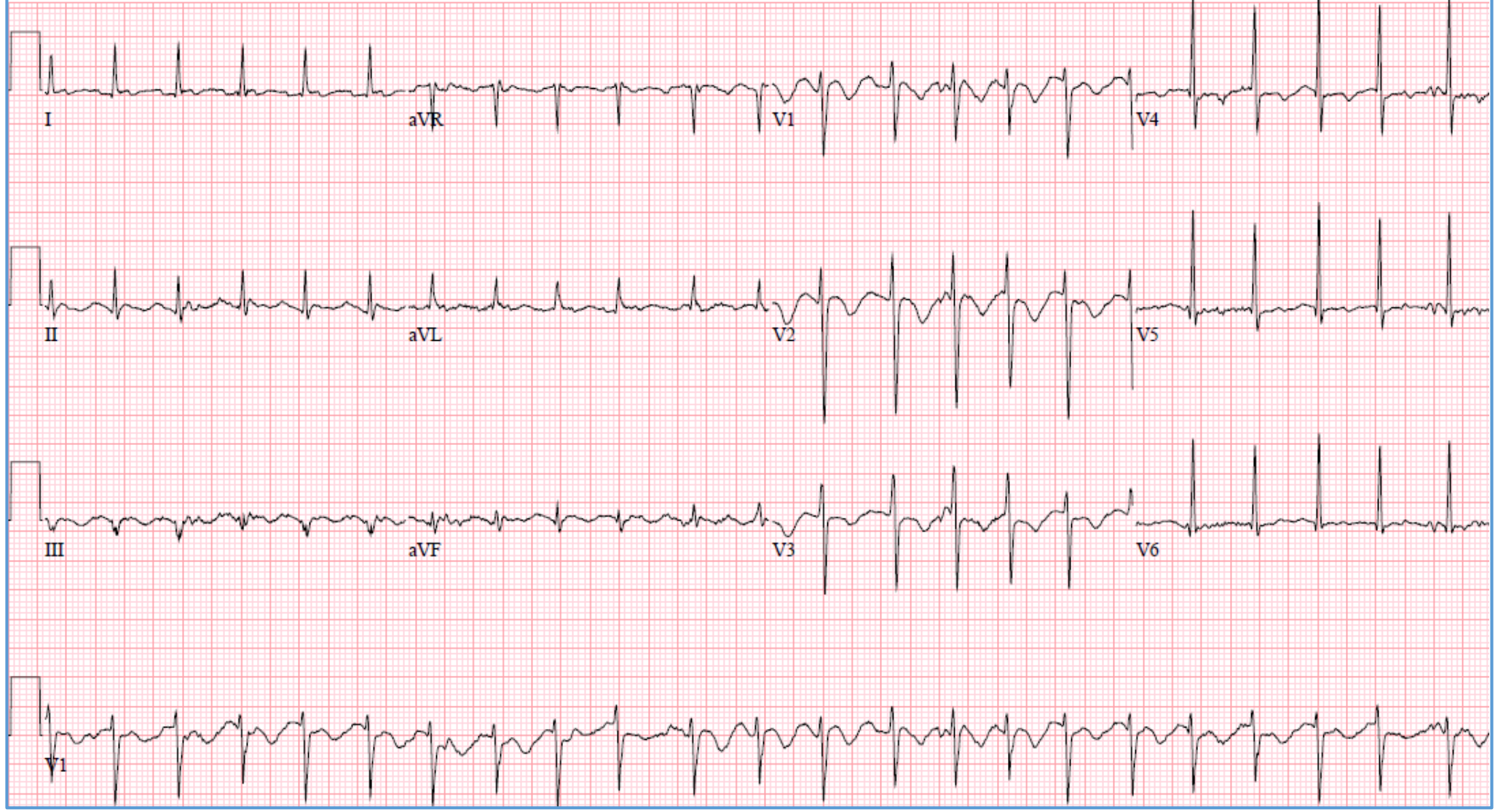
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= ? V= ~75 PR= ? QRS=100 QT=360 Axis= -20	Atrial fibrillation	• Moderate heart rate response to A-fib • normal IV	• A-fib activity • Huge voltage for LVH (V1-3) • T wave inversion I, aVL, V5,6 • Poor R wave progression V1-4	Abnormal ECG: 1. Rhythm (A-fib) 2. LVH with strain pattern

81 year old man with hypertension; what are those two FLB's?



Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=300 V=75 PR= ? QRS=110 QT=340 Axis= -60	Atrial flutter	Mostly 4:1 and occasional 2:1 AV conduction with RBBB aberrant conduction (arrow)	• Flutter waves • rS II, III, aVF with $S_{III}>S_{II}$ • Small q in aVL • LVH voltage (V2) with ST-T strain pattern	Abnormal ECG: 1. Rhythm (atrial flutter) 2. Left anterior fascicular block (LAFB) 3. LVH with strain

4-5

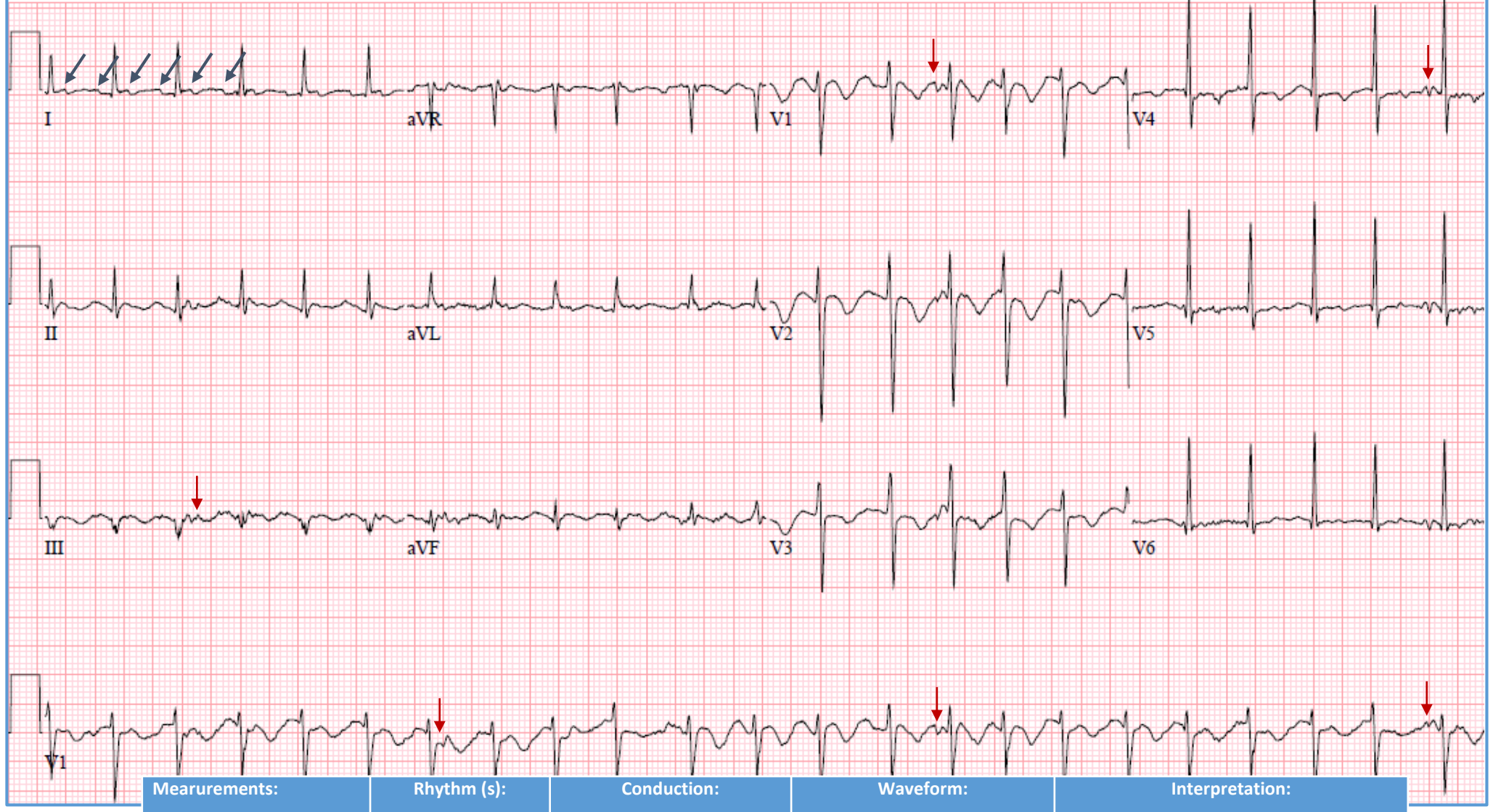


SG: 62 year old man

Official Interpretation:

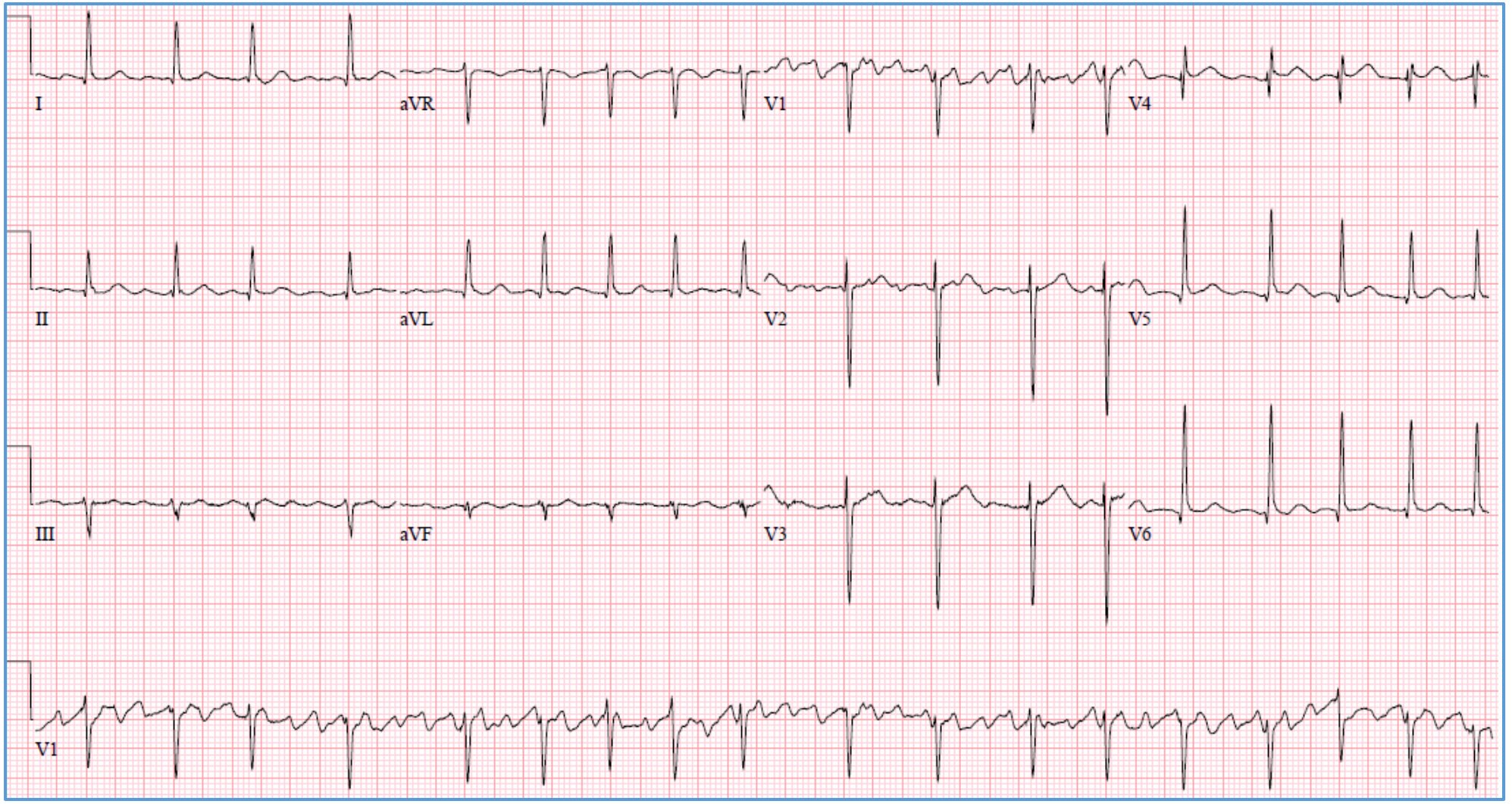
Atrial fibrillation with rapid ventricular response
ST & T wave abnormality, consider anterior ischemia
Abnormal ECG

4-6a



Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 280 V=140 PR= ? QRS=70 QT= ~320 Axis= +10	Atrial flutter	Mostly 2:1 AV conduction (note: mostly fixed (constant) RR intervals – rules out A-fib)	• Flutter waves (blue arrows) • T wave inversion V1-4 • Small Q's II, III, aVF • Note presence of artifact in some of the leads (red arrows)	Abnormal ECG 1. Rhythm (atrial flutter) 2. Nonspecific T abnormality 3. Possible old inferior MI

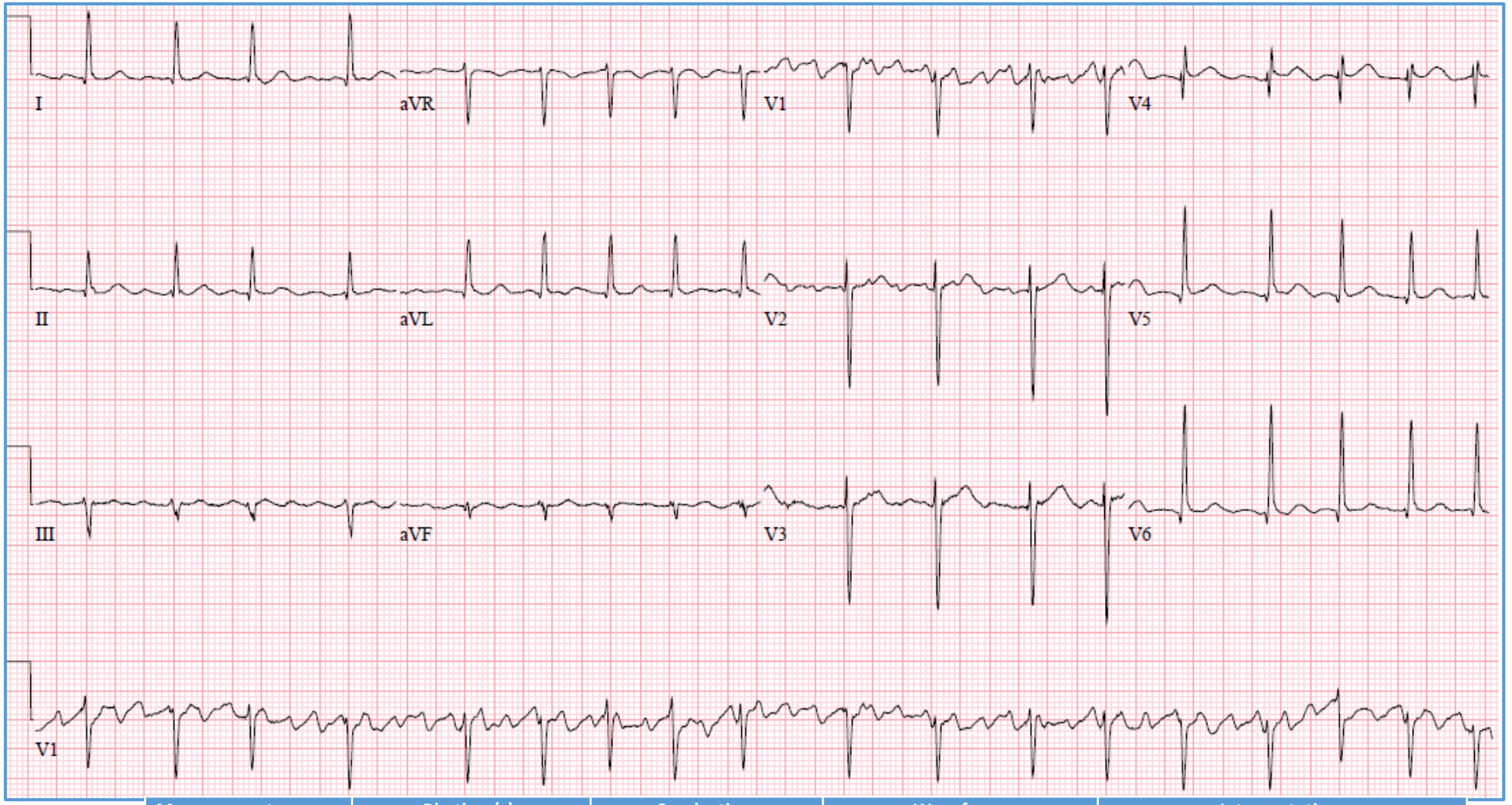
4-6a



JS: 82 year old woman

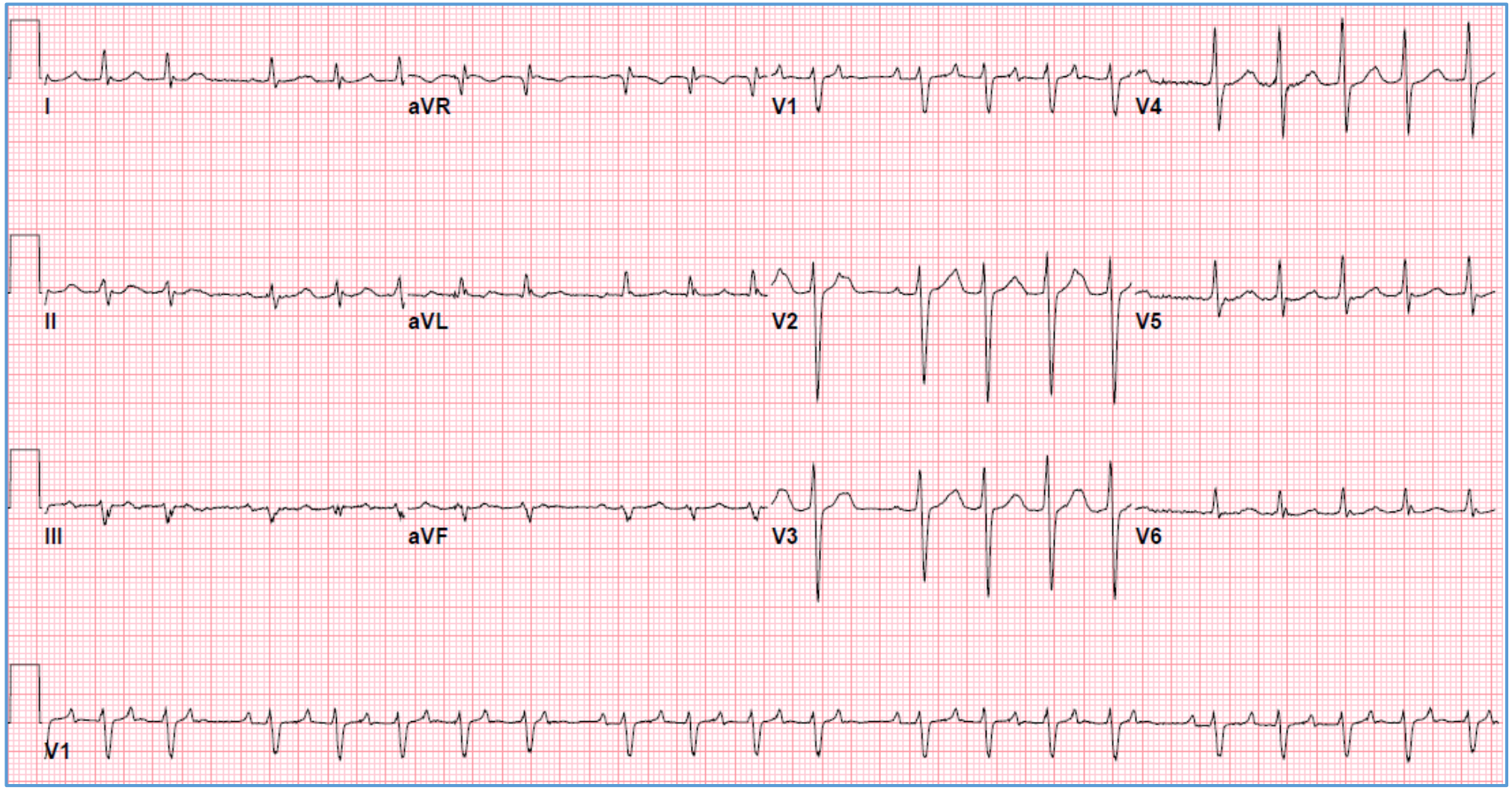
Official Interpretation:

Atrial flutter with variable A-V block
Nonspecific ST and T wave abnormalities
Abnormal ECG

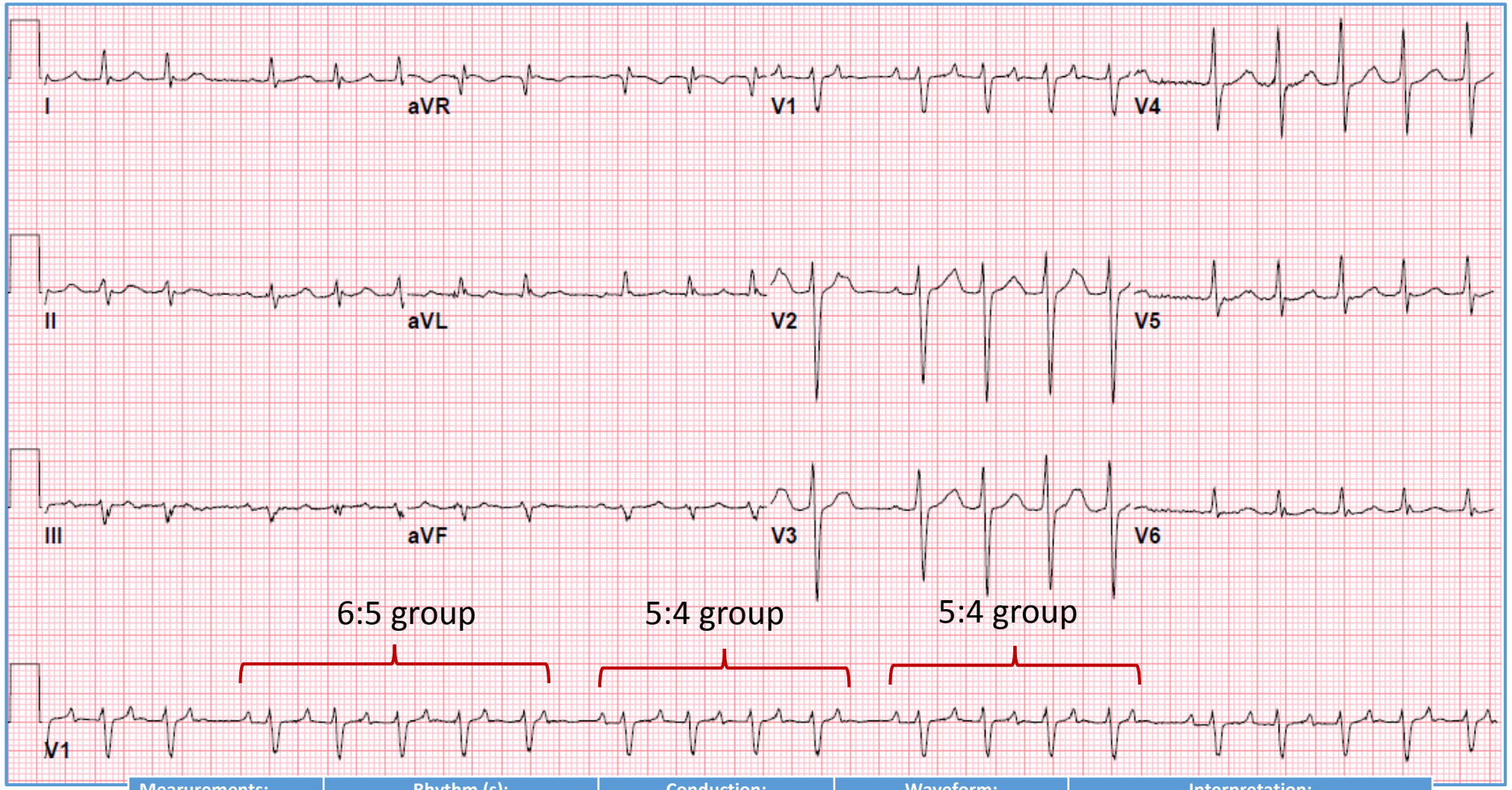


Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= ? V= 110 PR= ? QRS=70 QT=320 Axis= -10	Atrial fibrillation	Rapid ventricular response (>100 bpm)	• A-fib activity (best seen in V1 lead, not classic flutter waves) • Low amplitude T waves	Abnormal ECG: 1. Rhythm (A-fib) and rate 2. Nonspecific T wave abnormalities (minor) Note: The coarse a-fib activity in V1 somewhat resembles atrial flutter, but they are not equally spaced and have slightly varying morphology; this and the irregular RR intervals means A-fib)

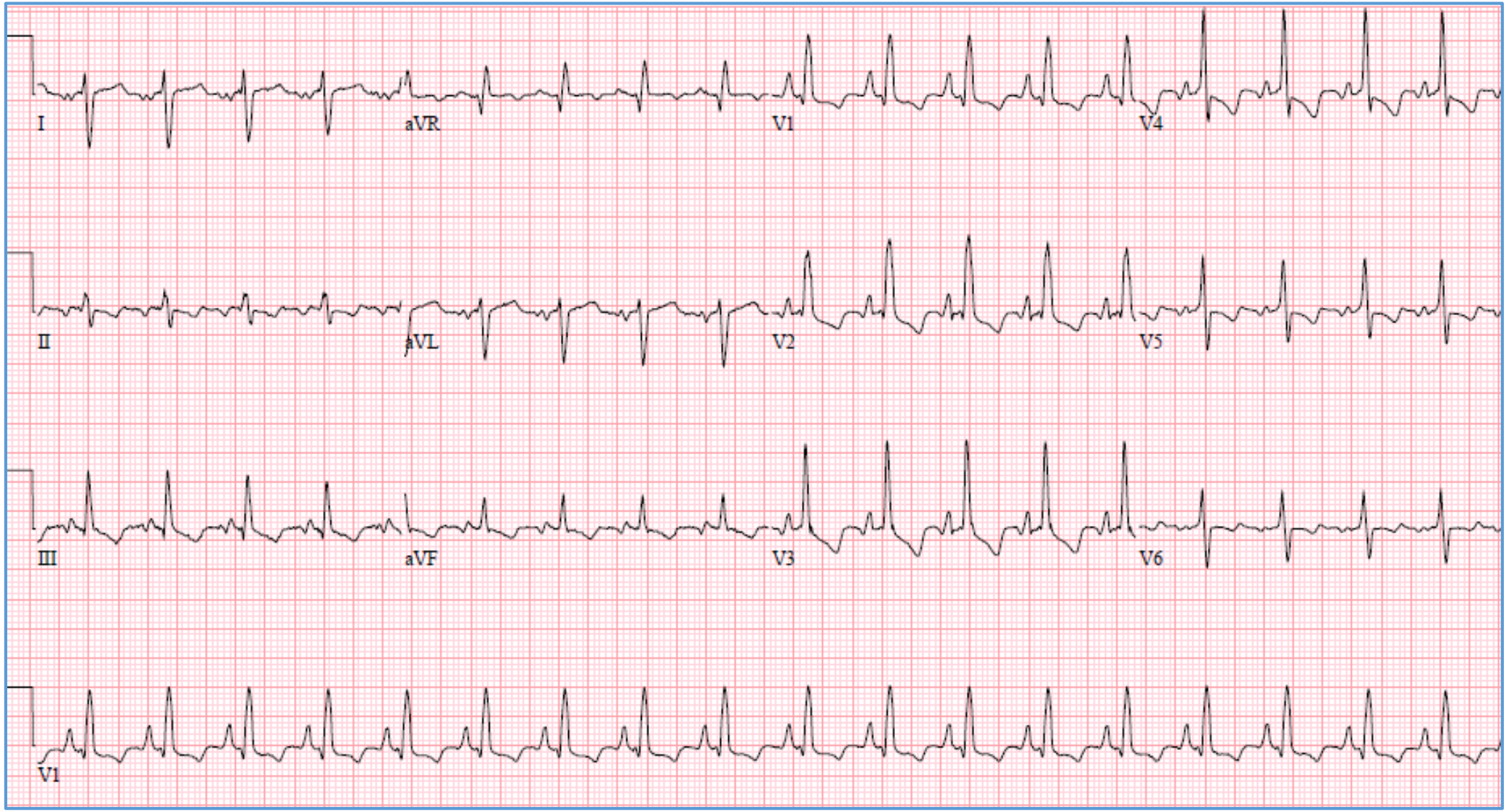
4-6b



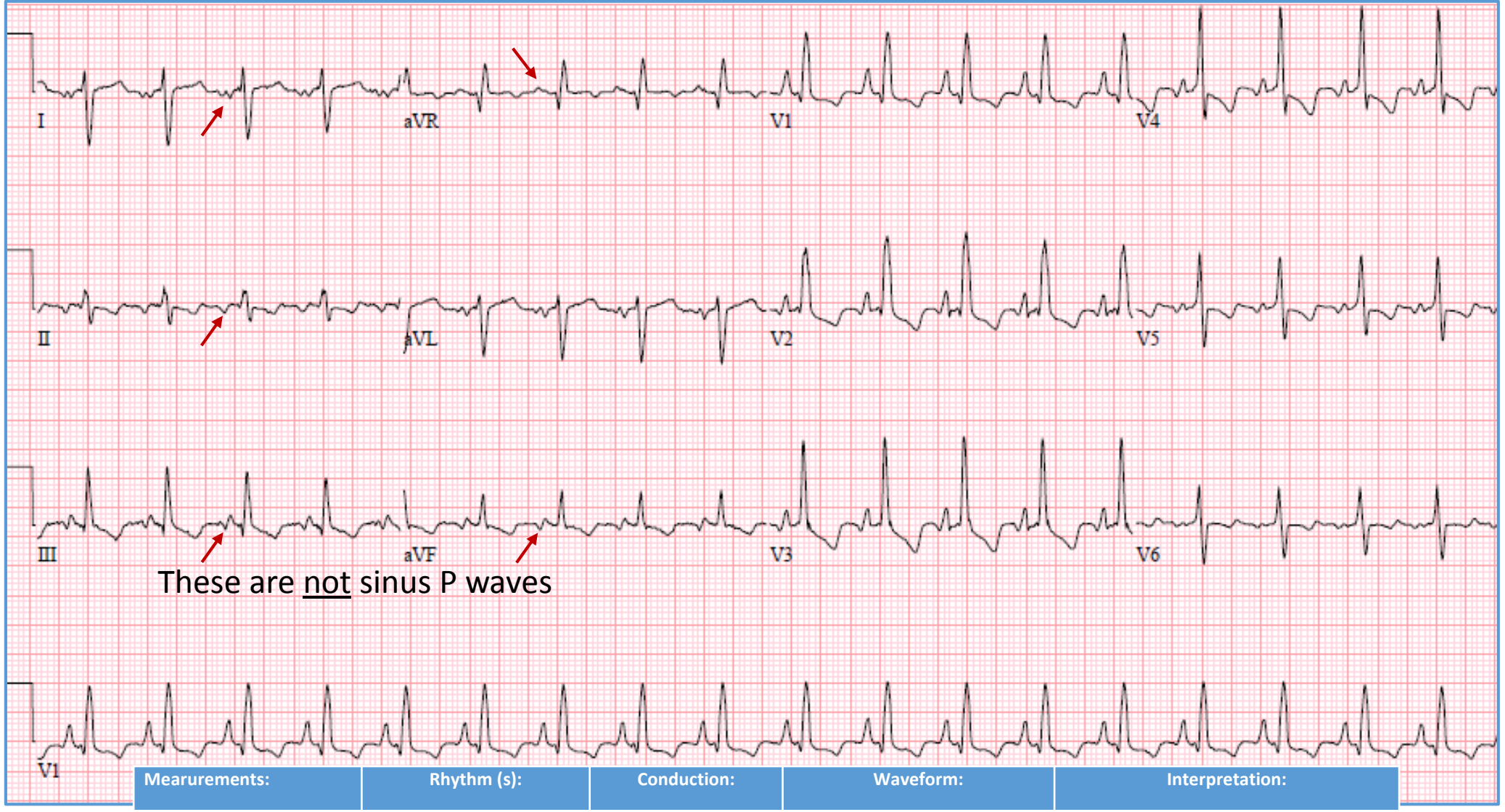
58 year old man with palpitations



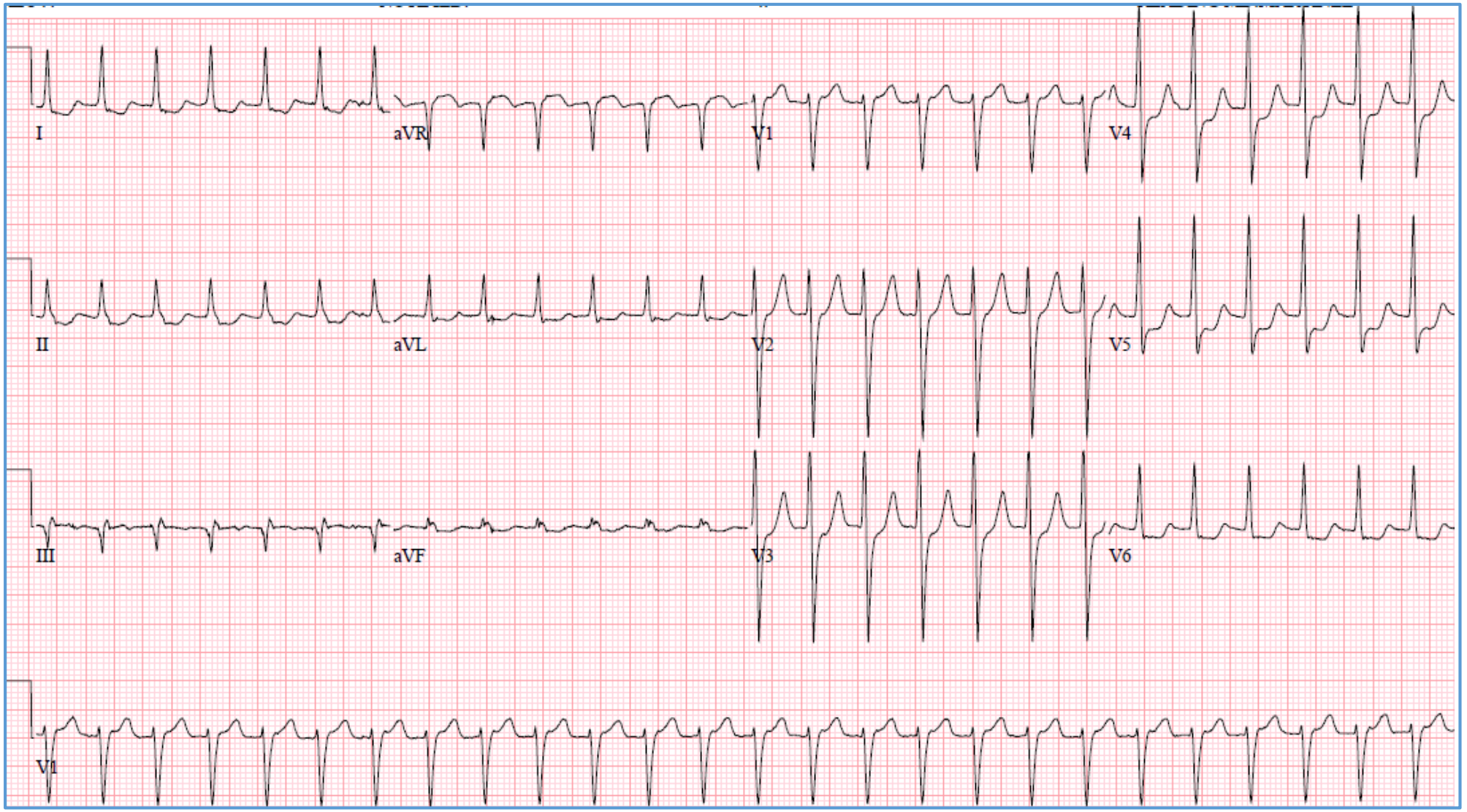
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 150 V=120 PR= variable QRS=80 QT=320 Axis=-30	Two choices: • Sinus tachycardia ***vs.*** • Ectopic atrial tachycardia (more likely) (P wave morphology and axis suggests sinus, but heart rate is a little too fast for a resting ECG in sinus rhythm)	2nd degree AV block (type I, Wenckebach) Note: repetitive ***group beating***	Normal P, QRS, ST-T	Abnormal ECG: 1. Rhythm and rate 2. 2nd degree AVB (type 1) 3. Borderline left axis deviation (LAD)



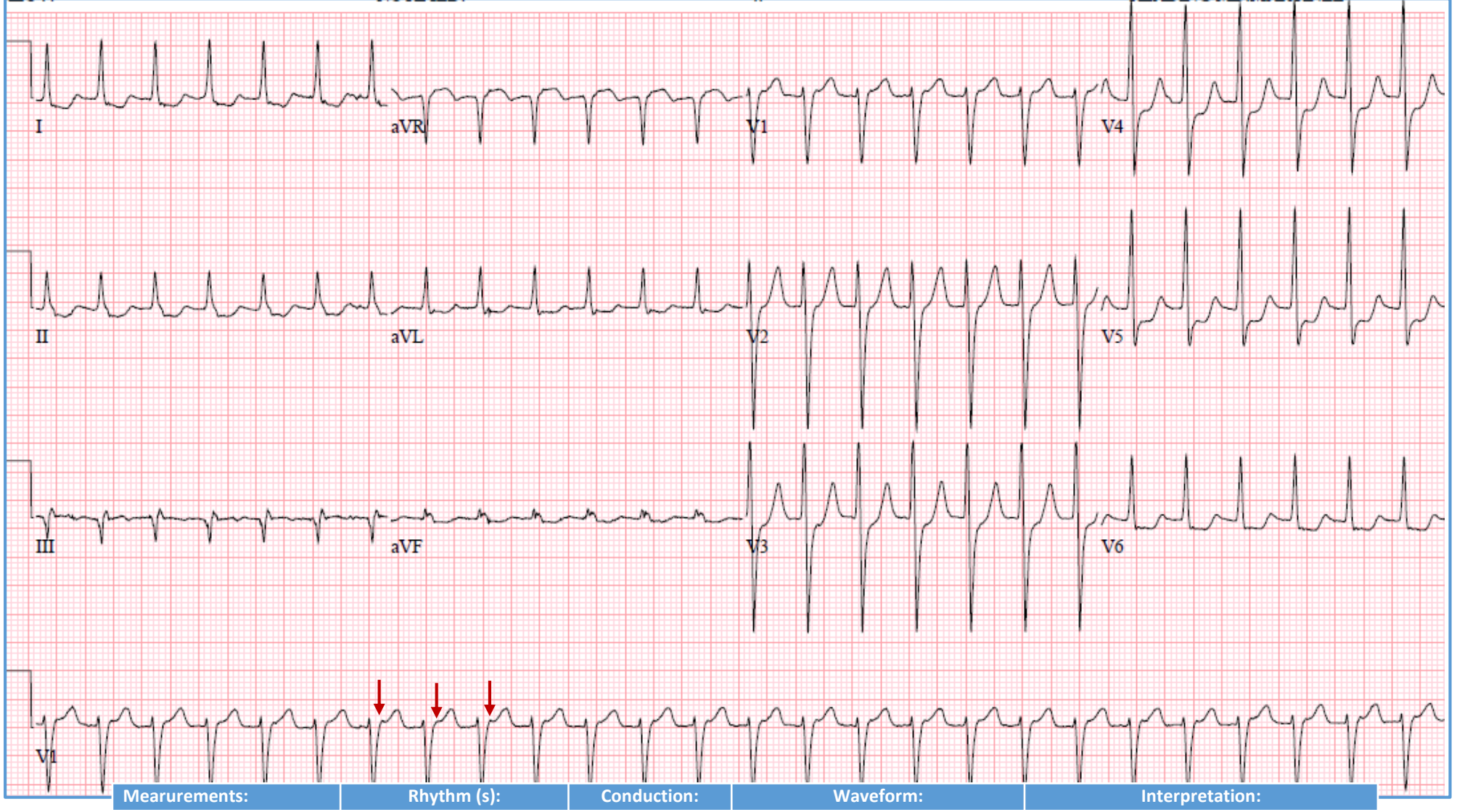
32 year old man with idiopathic pulmonary hypertension



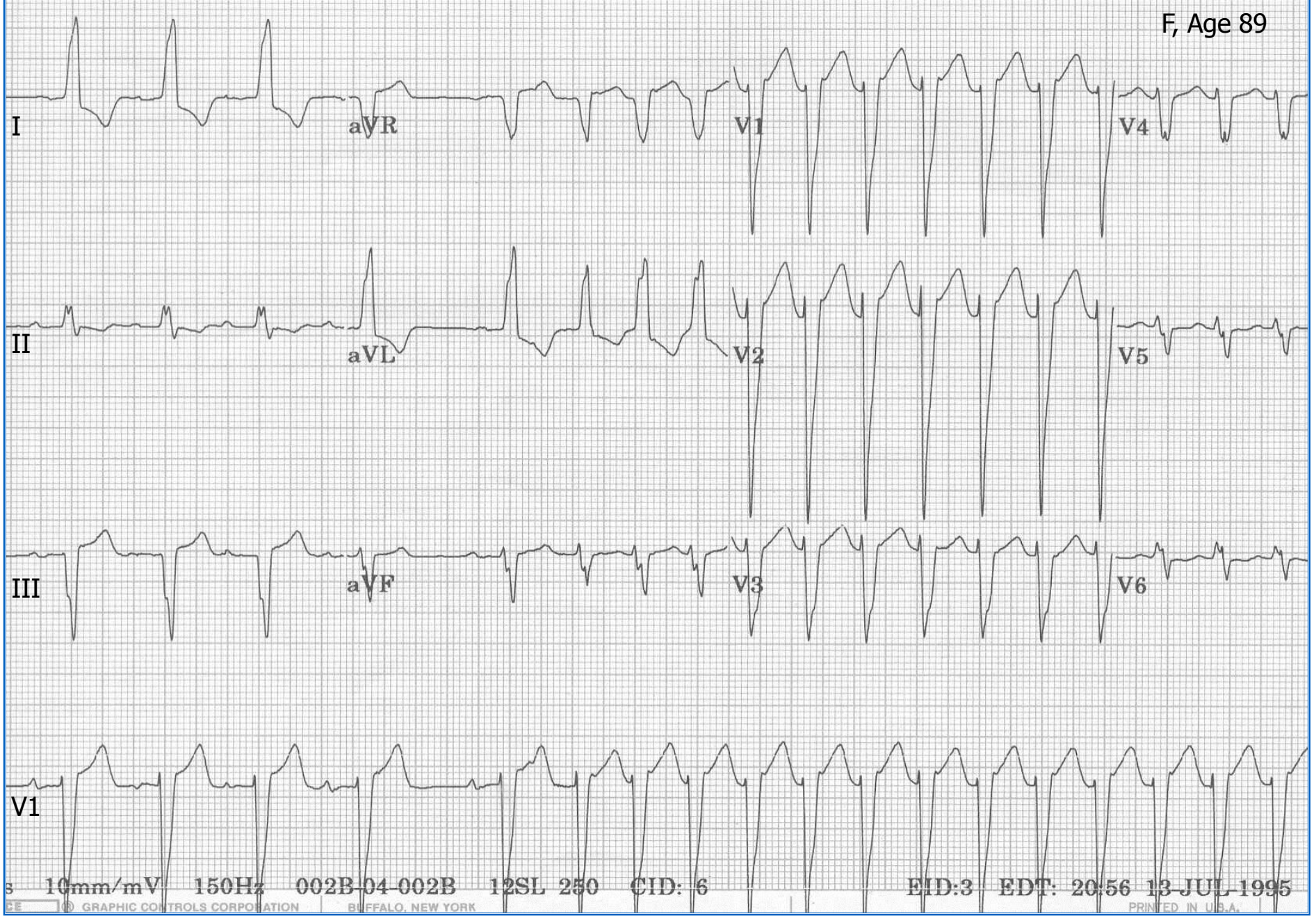
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 110 V= 110 PR=140 QRS=90 QT=360 Axis= +150	Ectopic atrial tachycardia	Normal AV, IV conduction	• Ectopic P wave morphology (can't be sinus, see arrows) • Prominent anterior forces • ST depression, T wave inversion in II, III, aVF, V1-6	Abnormal ECG: 1. Rhythm 2. Right axis deviation (RAD) 3. RAE (based on tall P in V1-2 even though not sinus rhythm) 4. RVH with strain pattern



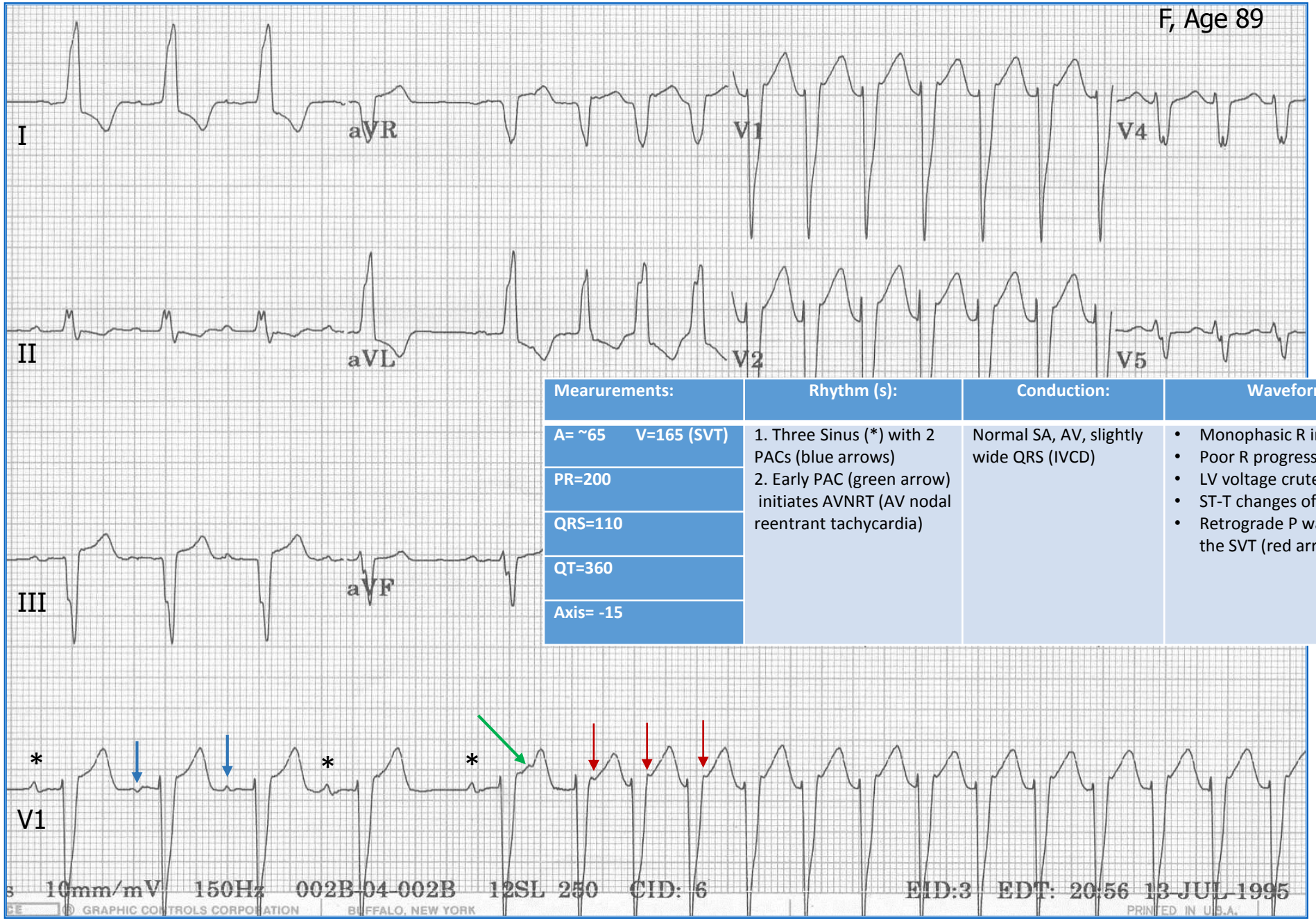
55 year old man with palpitations



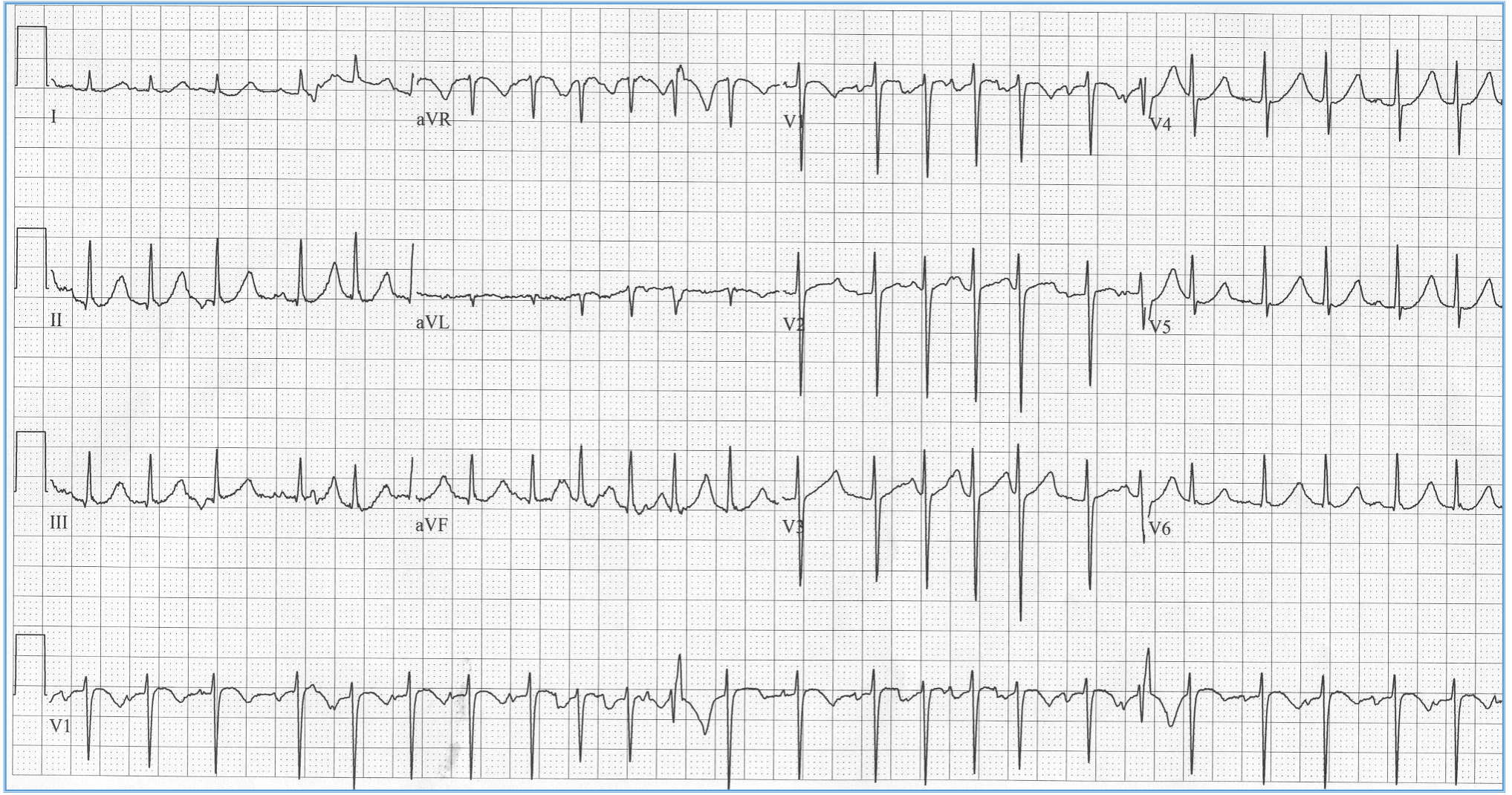
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 160 V= 160 PR= none QRS= 80 QT= 300 Axis= +10	Supraventricular tachycardia (most likely AVNRT)	Normal IV	• ST depression I, II, aVL, V3-6	Abnormal ECG: 1. Rhythm and rate; AVNRT is most likely diagnosis because there is a hint of retrograde P waves just after QRS in V1 (arrows) 2. ST depression suggestive of ischemia (kind of like a + ECG stress test)



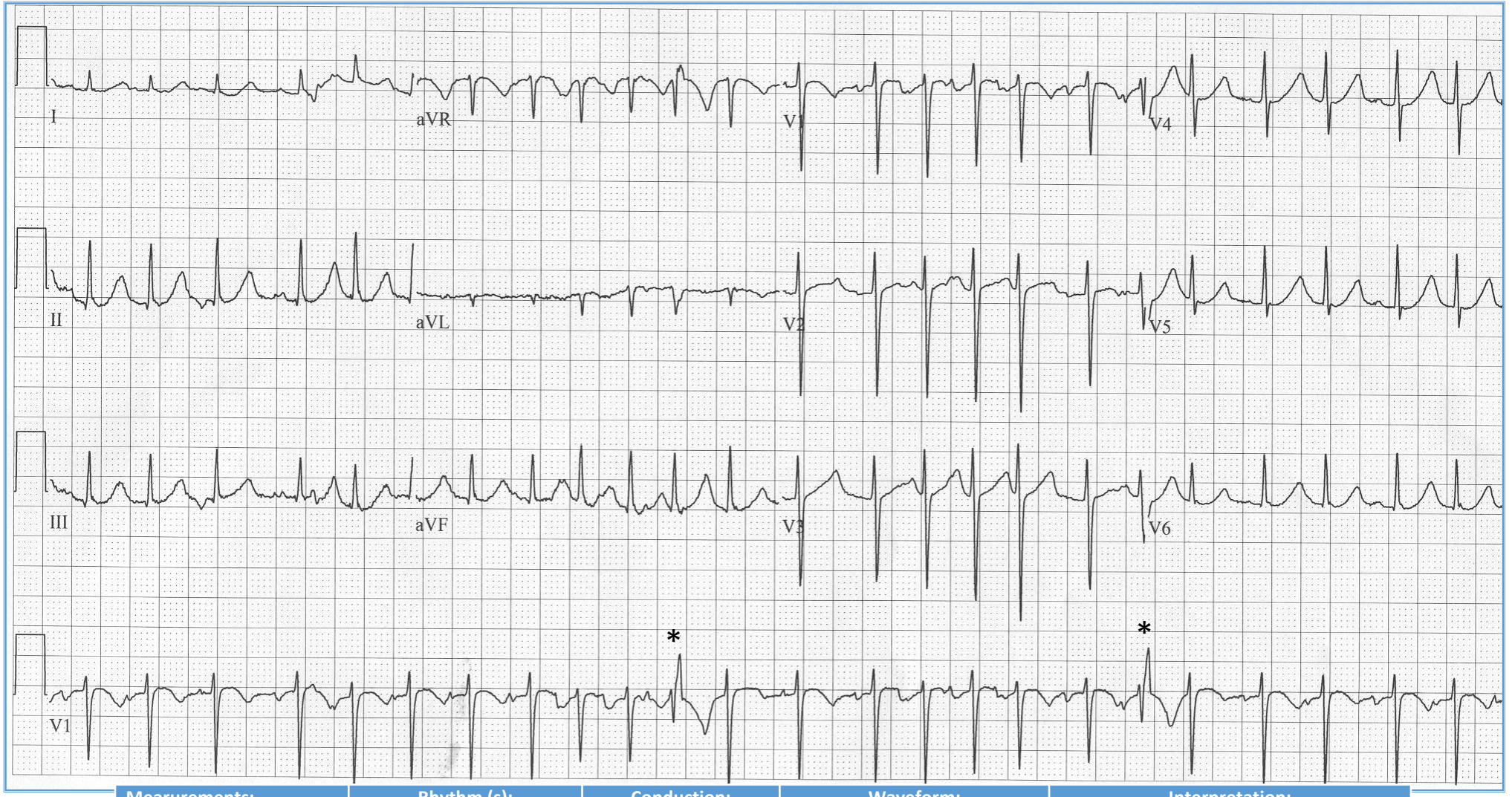
89 year old woman with intermittent palpitations; history of chronic HFrEF



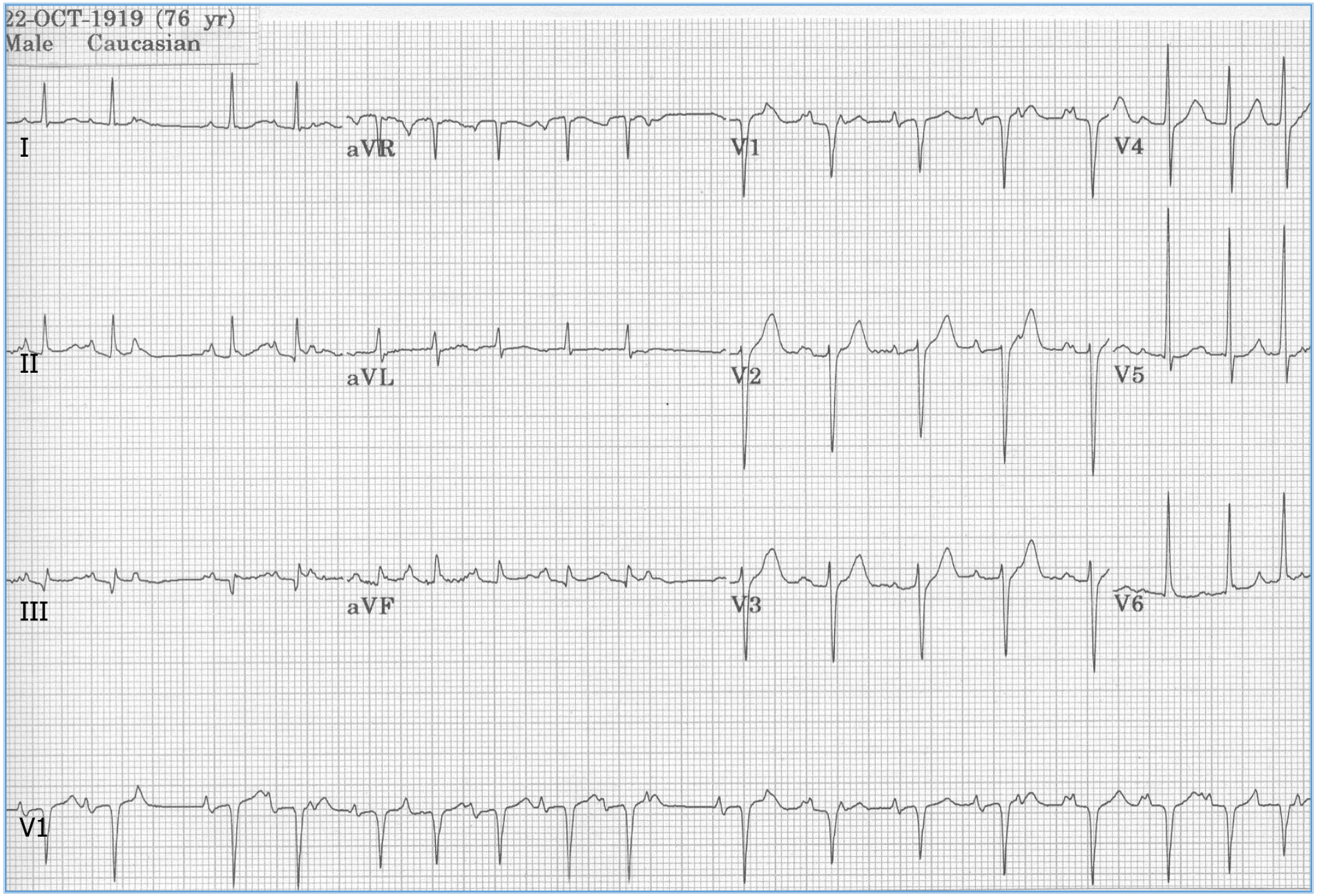
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= ~65 V=165 (SVT) PR=200 QRS=110 QT=360 Axis= -15	1. Three Sinus (*) with 2 PACs (blue arrows) 2. Early PAC (green arrow) initiates AVNRT (AV nodal reentrant tachycardia)	Normal SA, AV, slightly wide QRS (IVCD)	• Monophasic R in I and aVL • Poor R progression (V1-5) • LV voltage cruteria + • ST-T changes of LV strain • Retrograde P waves during the SVT (red arrows)	Abnormal ECG: 1. Rhythm (PAC's and AVNRT) 2. LVH with ST-T abnormalities 3. Incomplete LBBB (often seen with severe LVH)



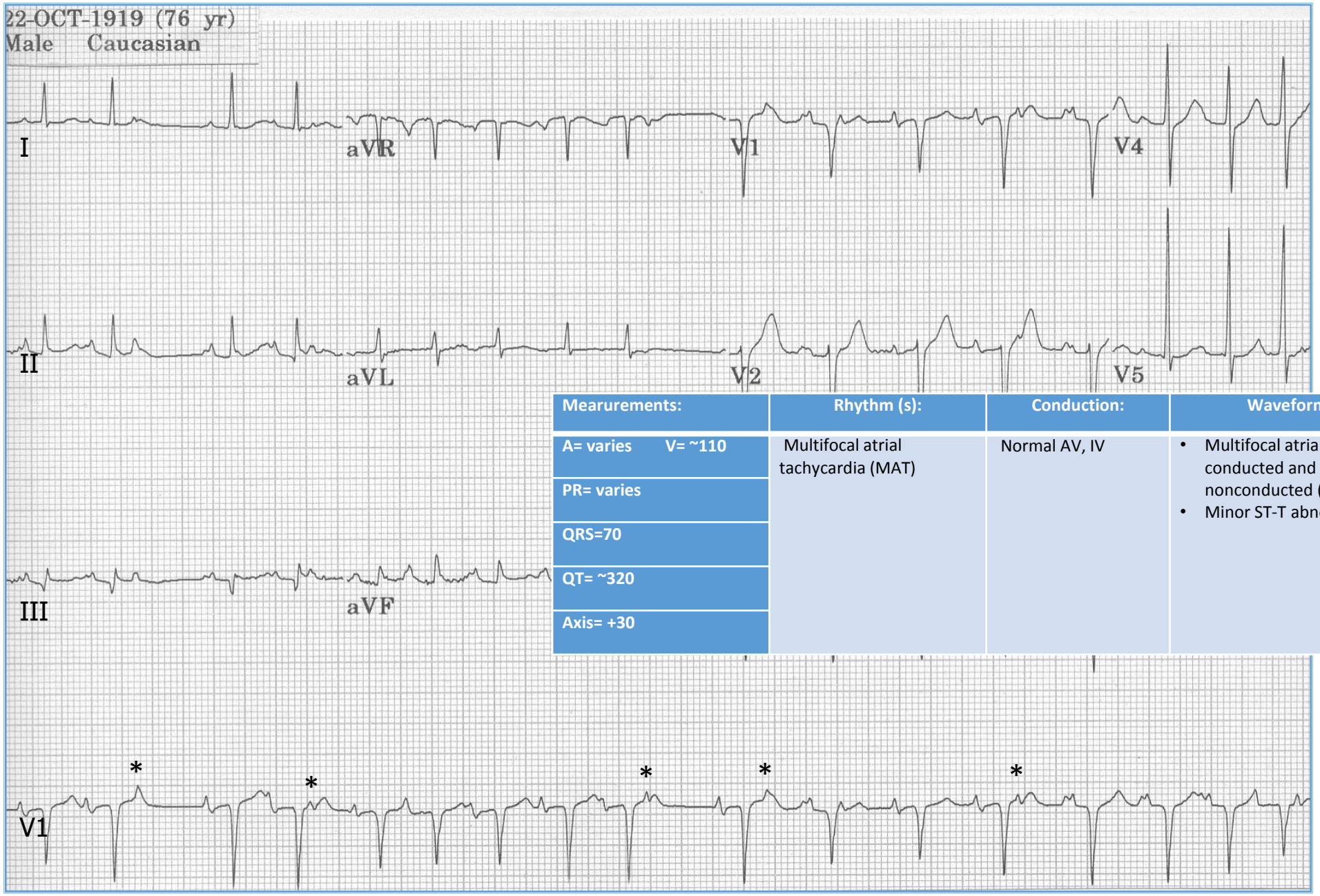
77 y.o. woman in E.R. with dyspnea and ↑ BNP



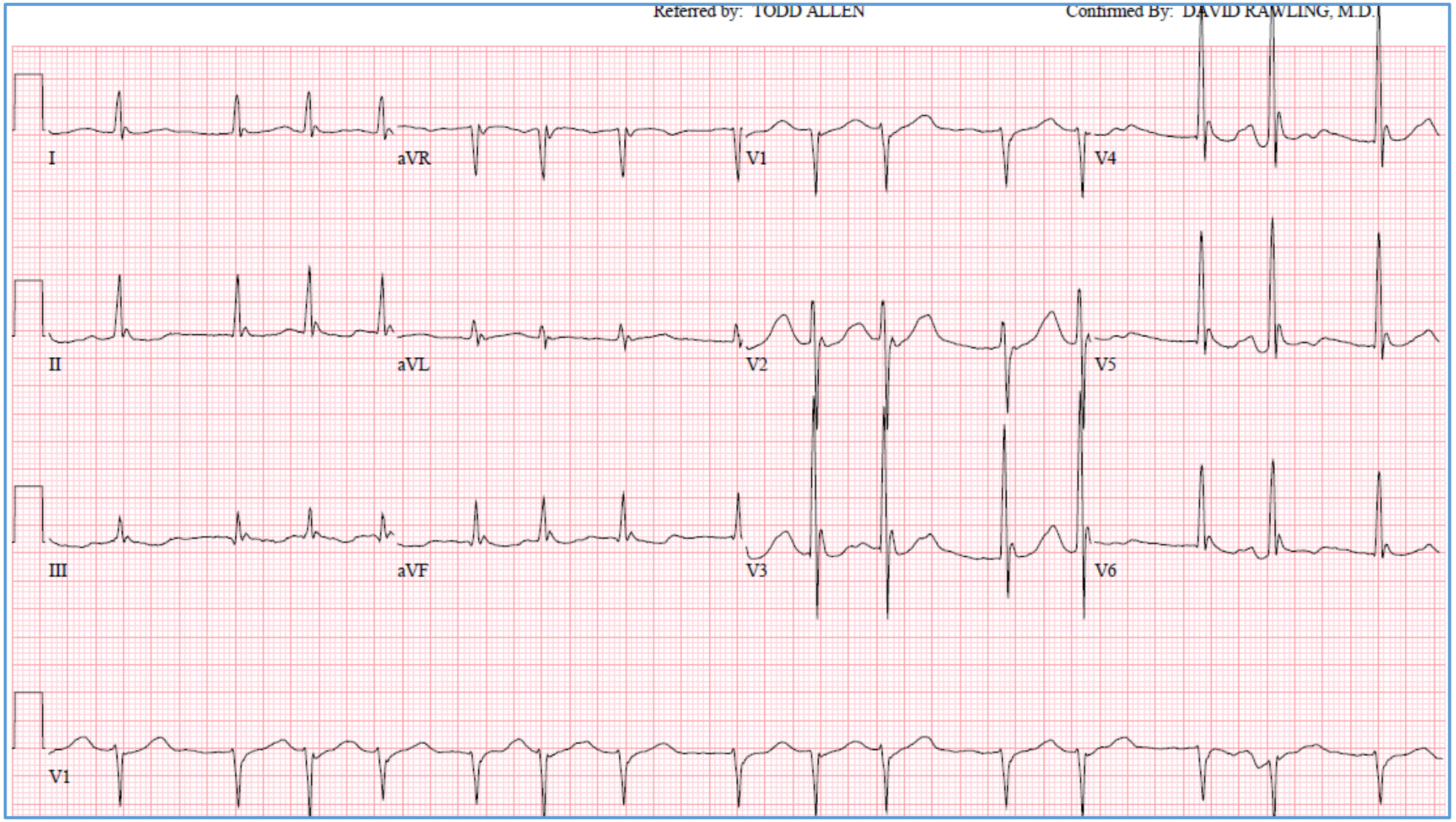
Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= varies V= ~150 PR= varies QRS=70 QT= ~320 Axis= +70	Multifocal atrial tachycardia (MAT)	Normal AV, IV	• Multifocal atrial activity (note varying P wave morphology in V1, II, III) • 2 incomplete RBBB aberrancies (*), classic rsR‘ - not to be confused with PVC‘s.	Abnormal ECG: 1. Rhythm (MAT) and rate


22-OCT-1919 (76 yr)
Male Caucasian
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1

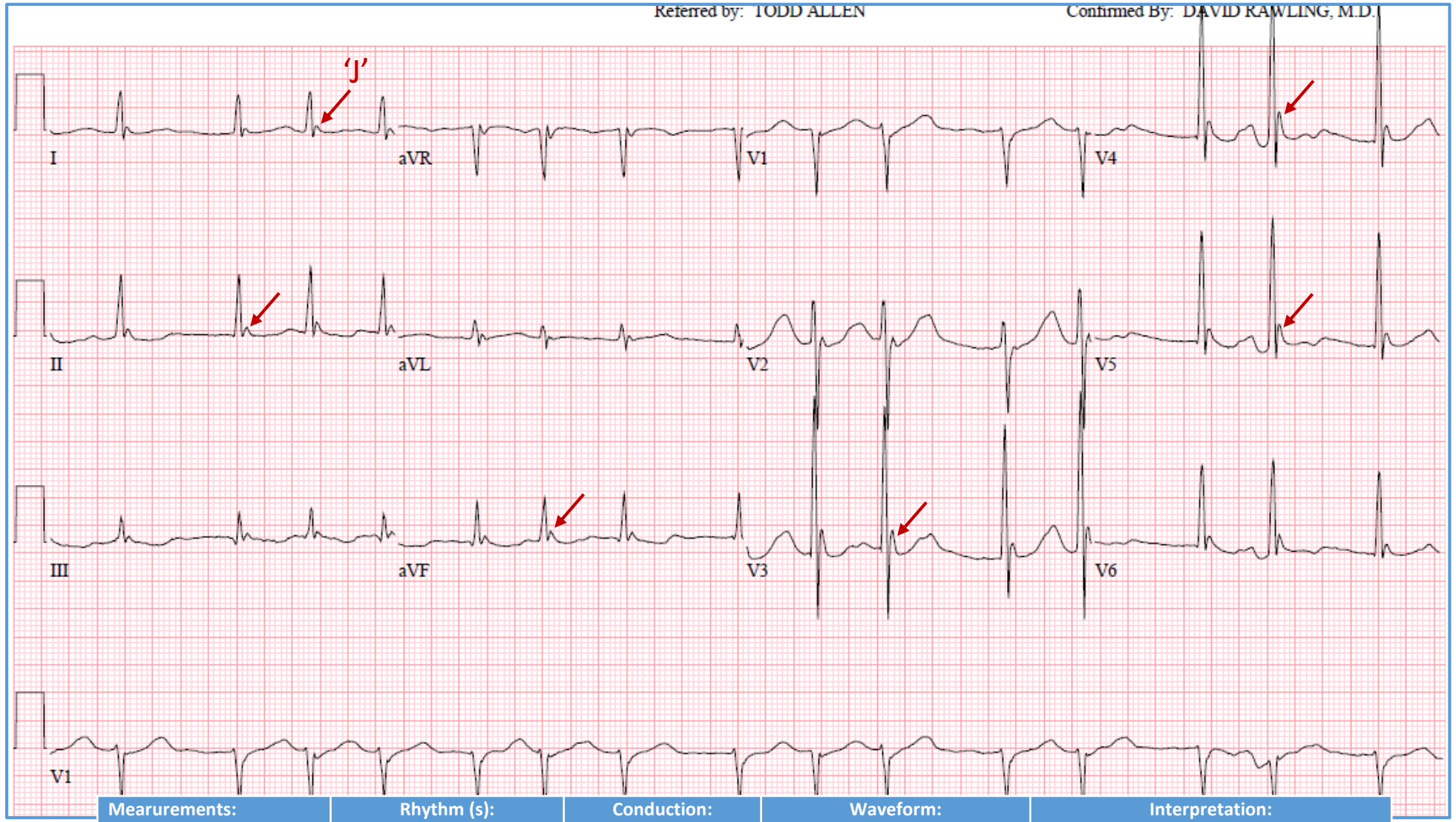
4-12



Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= varies V= ~110 PR= varies QRS=70 QT= ~320 Axis= +30	Multifocal atrial tachycardia (MAT)	Normal AV, IV	• Multifocal atrial activity conducted and nonconducted (*) • Minor ST-T abnormalities	Abnormal ECG: 1. Rhythm (MAT) and rate 2. Nonspecific ST-T changes

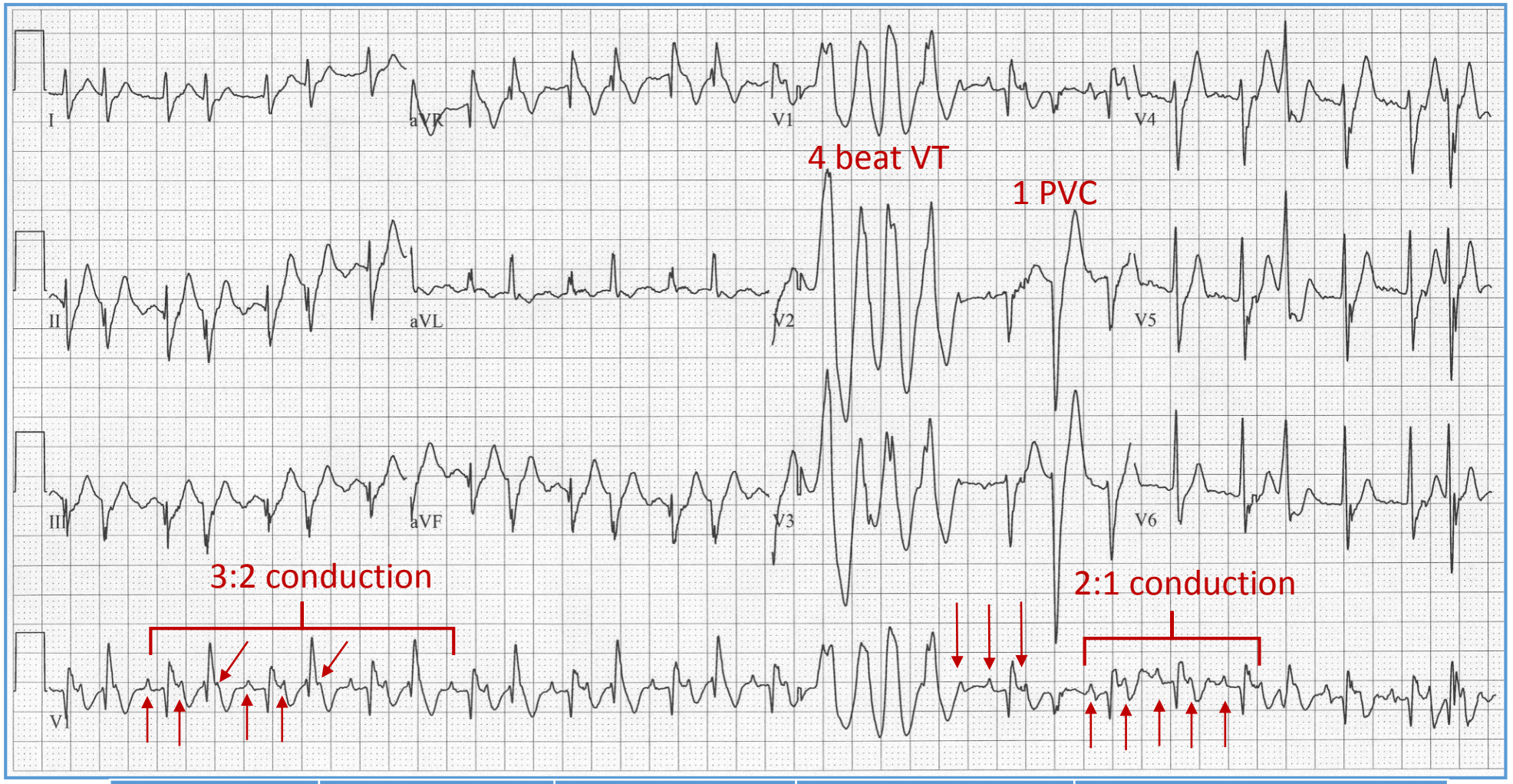


November, 2002: 49 year old woman with altered mental status (found in Pioneer Park)

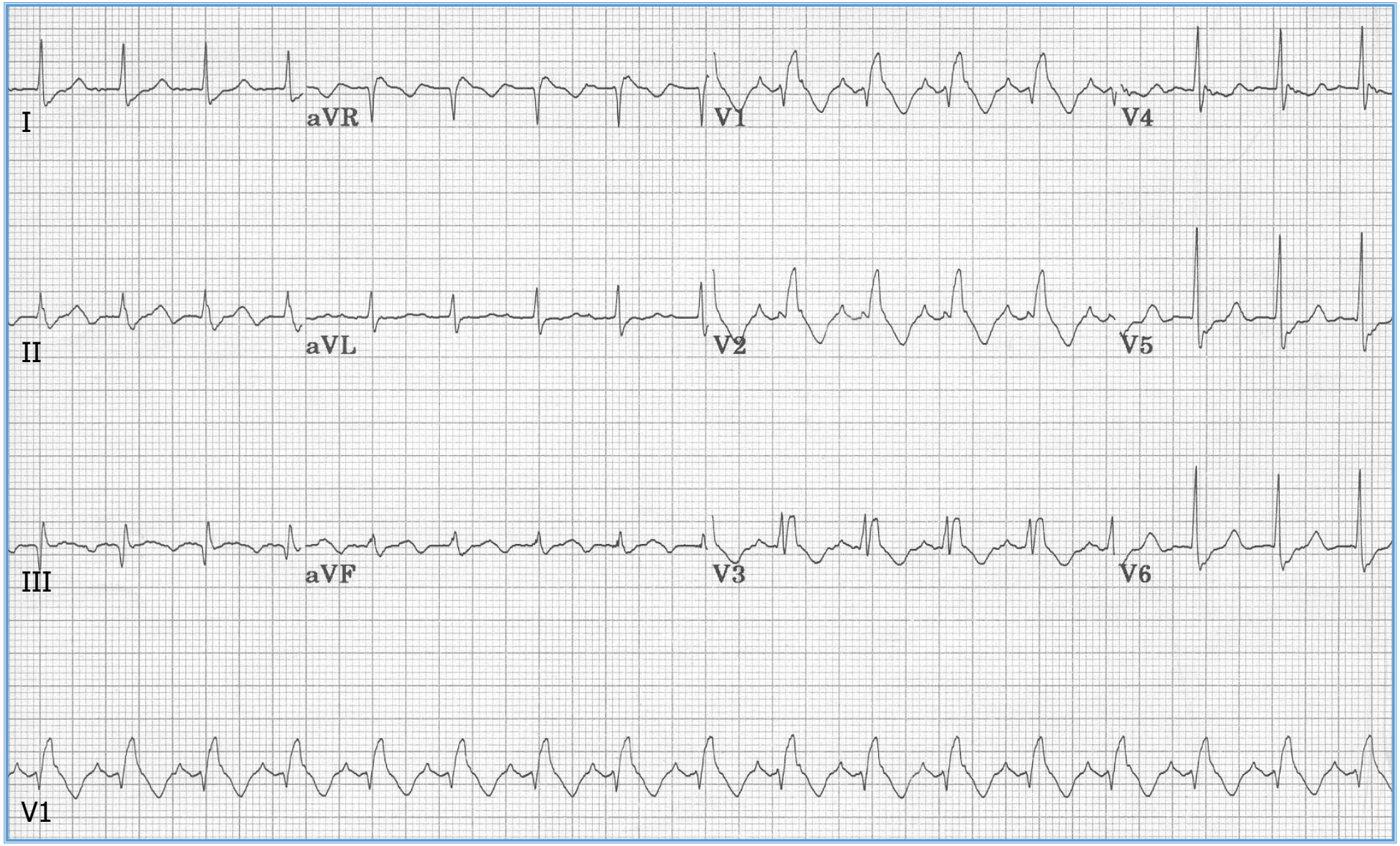


Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= ? V= ~110 PR= QRS=80 QT=~440 Axis= +60	Atrial fibrillation with rapid HR response	Normal AV and IV	• 'J' waves or Osborn waves (J waves are created when the epicardial cells are cooler than the endocardial cells; they are also seen in other electrical heart diseases, and in hypercalcemia) • Low amplitude T waves	Abnormal ECG: 1. Rhythm and rate 2. Hypothermia 3. Nonspecific T abnormalities 4. Prolonged QT (seen in hypothermia)

JM: 56 y.o. man with palpitations; looks complicated, doesn't it?



Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=250 V= ~200 PR= varies QRS=80, and 100 QT=~240 Axis= -75	• Atrial flutter (arrows) • 4-beat V-tachycardia • 1 PVC	Both 2:1 and 3:2 AV conduction are seen with the atrial flutter	• rsR‘ alternating with qR in lead V1	Abnormal ECG: 1. Rhythms and rate 2. Incomplete RBBB What initially looks complicated can be resolved by breaking up the rhythm into segments, looking carefully for atrial activity, atrial rate, and how each atrial event relates to the QRS‘s (arriws)



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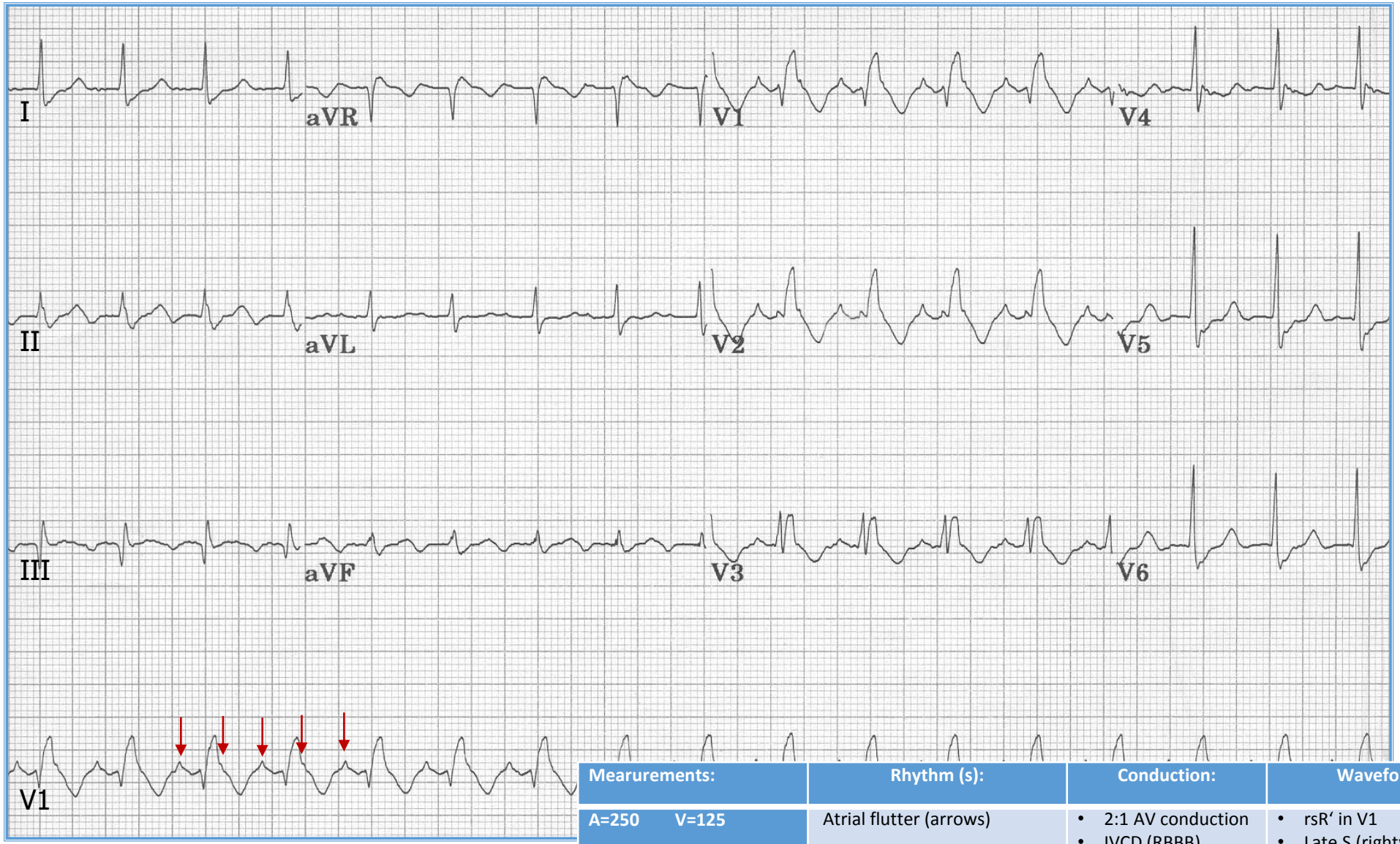

Mearurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=250 V=125 PR= ? QRS=150 QT=360 Axis= 0	Atrial flutter (arrows) Note: every other flutter wave is hidden at end of the R‘ of RBBB. Lead V1 is the only good lead in this ECG for identifying the rhythm.	• 2:1 AV conduction • IVCD (RBBB)	• rsR‘ in V1 • Late S (rightward force) in I, aVL, V5-6	Abormal ECG: 1. Rhythm and rate 2. RBBB